STEERING COLUMN

STEERING WHEEL, REMOVING AND INSTALLING

Special tools and equipment

- V.A.G 1331 Torque wrench

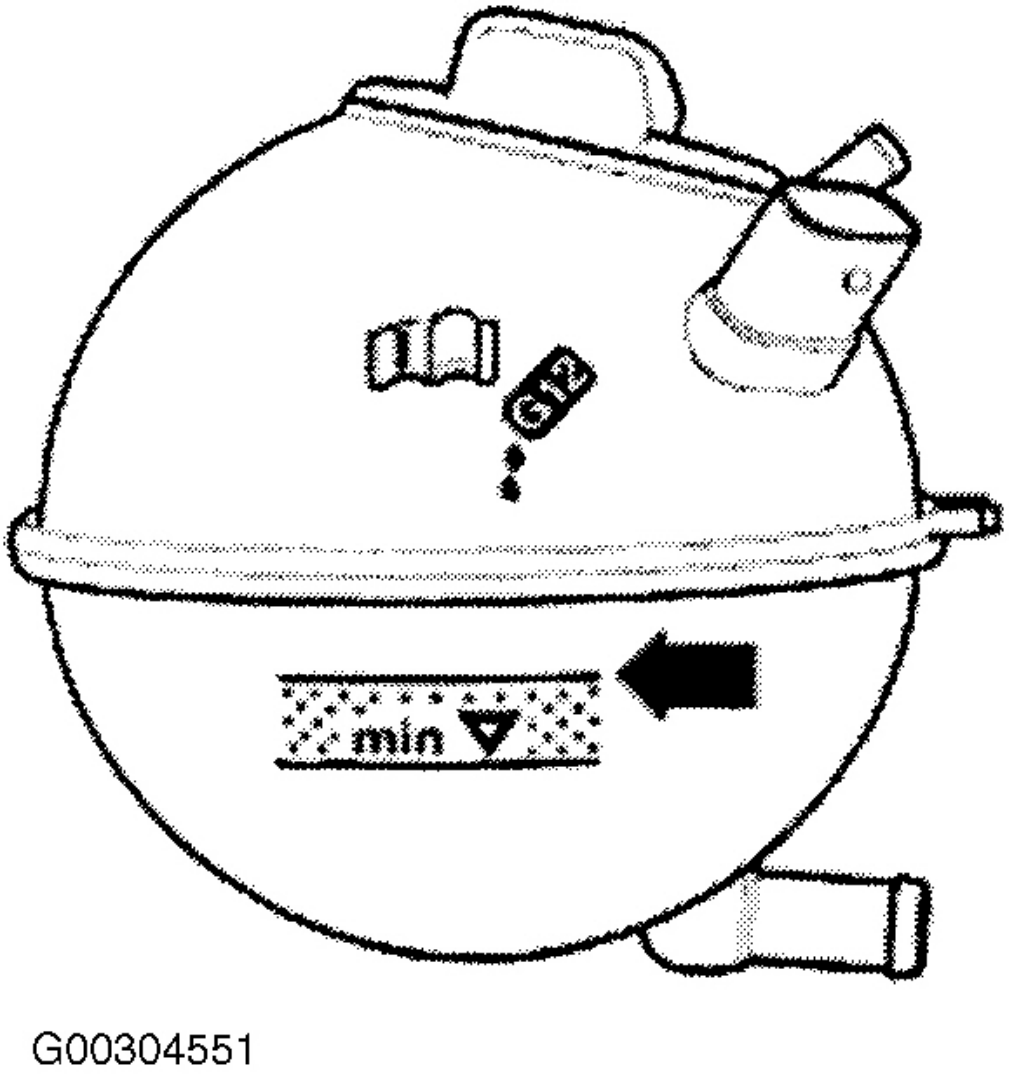


Fig. 1: Identifying V.A.G 1331 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

The steering column is only supplied complete, less steering lock housing, as a spare part.

Servicing of steering column is not possible.

The steering lock housing can be transferred.

Removing and installing steering lock housing. See **STEERING LOCK HOUSING, REMOVING AND INSTALLING**

WARNING: Before working on the electrical system and before removing the steering wheel the following conditions must be met:

- **Disconnect ground strap from battery**
- **Wheels must be in straight ahead position.**

If these instructions are not observed it is possible that the airbag system may fail later!

- Turn wheels to straight ahead position.
- Remove steering wheel.
- Remove covering in footwell.
- Remove steering wheel.

See appropriate AIR BAG RESTRAINT SYSTEMS article

Remove trim for steering column switch. See **Removing trim for steering column switch** .

For vehicles with steering angle sensor -G85-

After work on steering column switch, check basic setting of steering angle sensor -G85-. See **CONTINUED FOR ALL VEHICLES** .

- Remove steering angle sensor -G85-.

See **STEERING ANGLE SENSOR -G85-, REMOVING AND INSTALLING** .

For vehicles without steering angle sensor -G85-

- Release locking tabs -arrows- and pull spiral spring with slip ring off steering column switch.
- Disconnect harness connector -1-

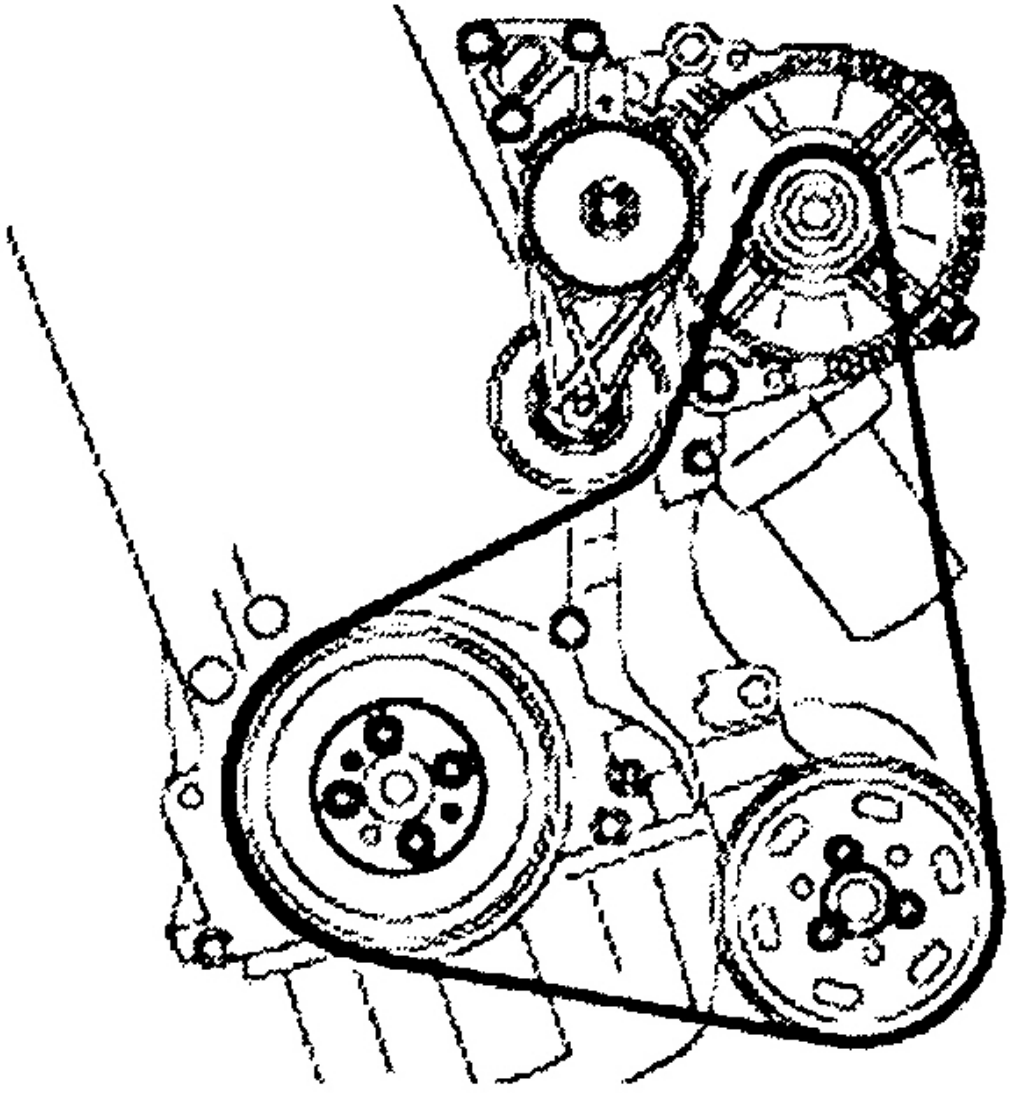
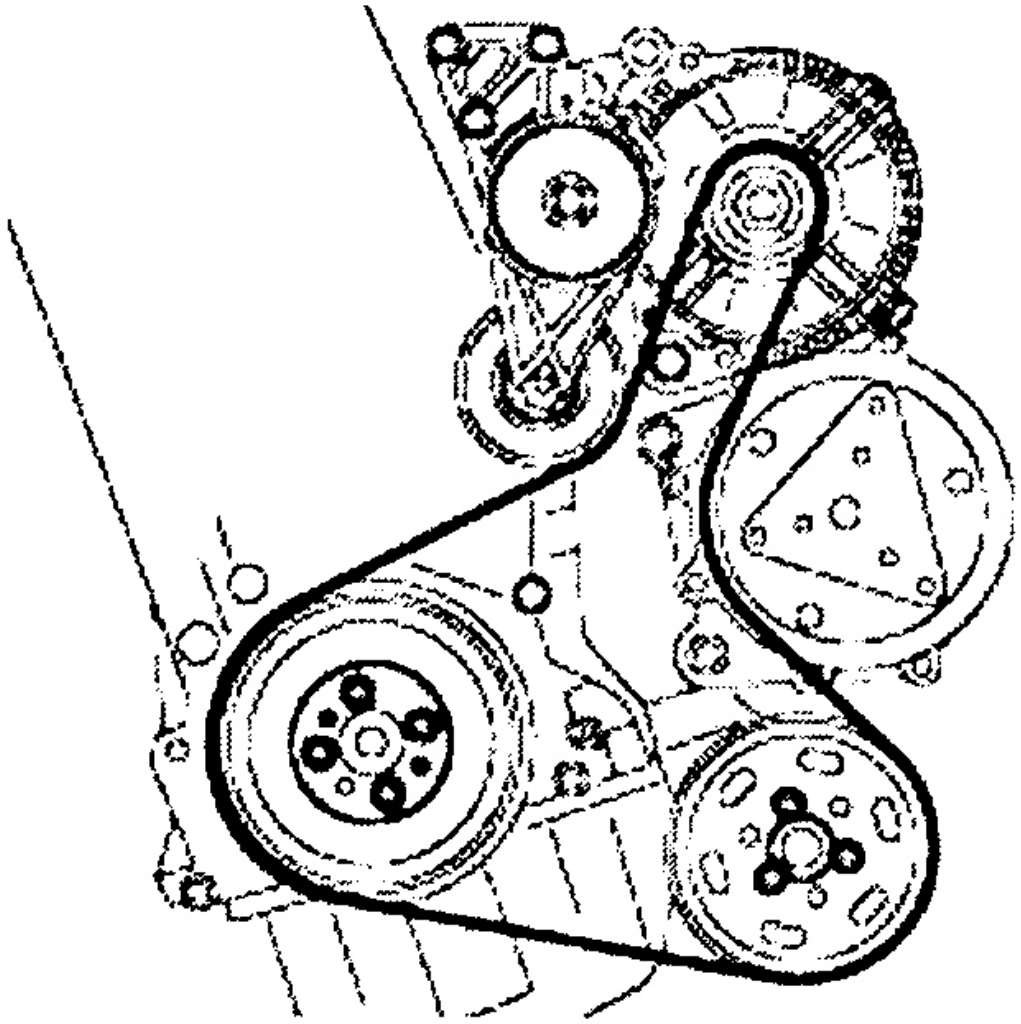


Fig. 2: Removing Spiral Spring Locking Tabs
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Sequence for all vehicles

- Remove screw for steering column switch -arrow- and remove steering column switch.



G00027340

Fig. 3: Removing Steering Column Switch Screw
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The ignition key removal lock cable must be unhooked on vehicles with an automatic transmission. See **LOCKING CABLE FOR IGNITION WITH KEY WITHDRAWAL LOCK, REMOVING AND INSTALLING**

- Remove plastic cover -1- over shear head bolts.
- Release cable tie wrap.

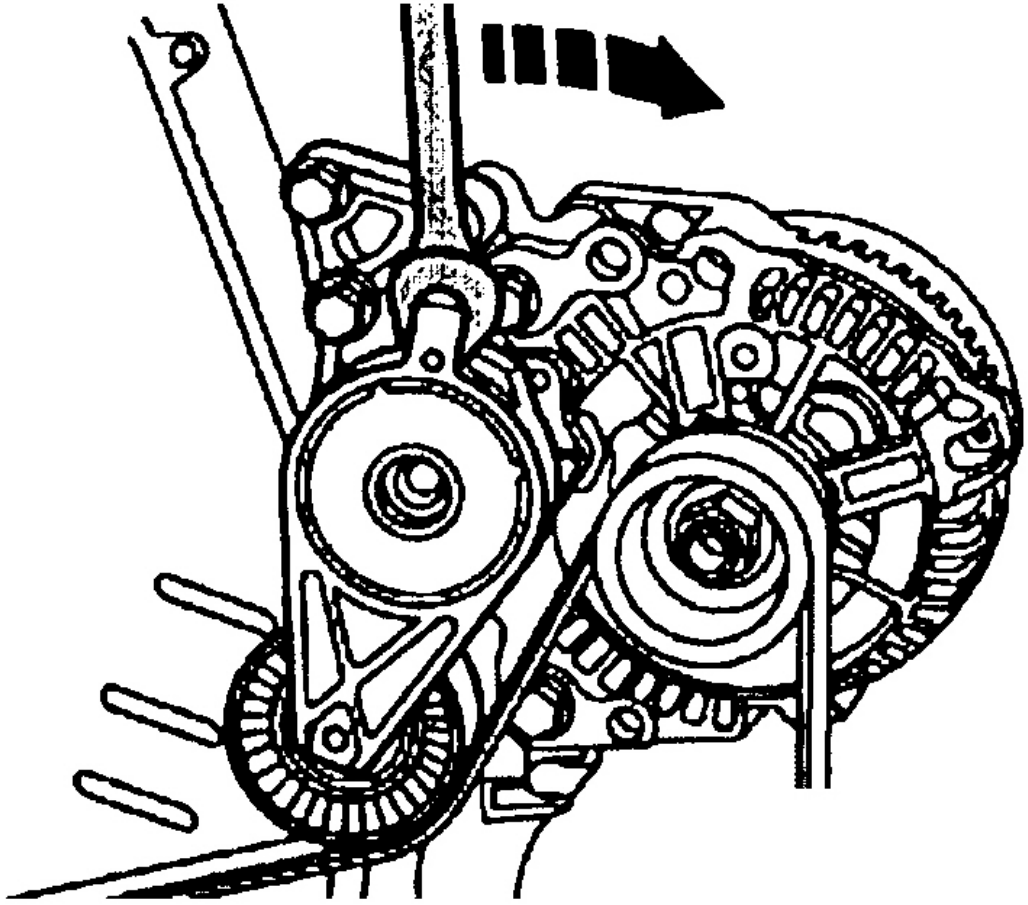
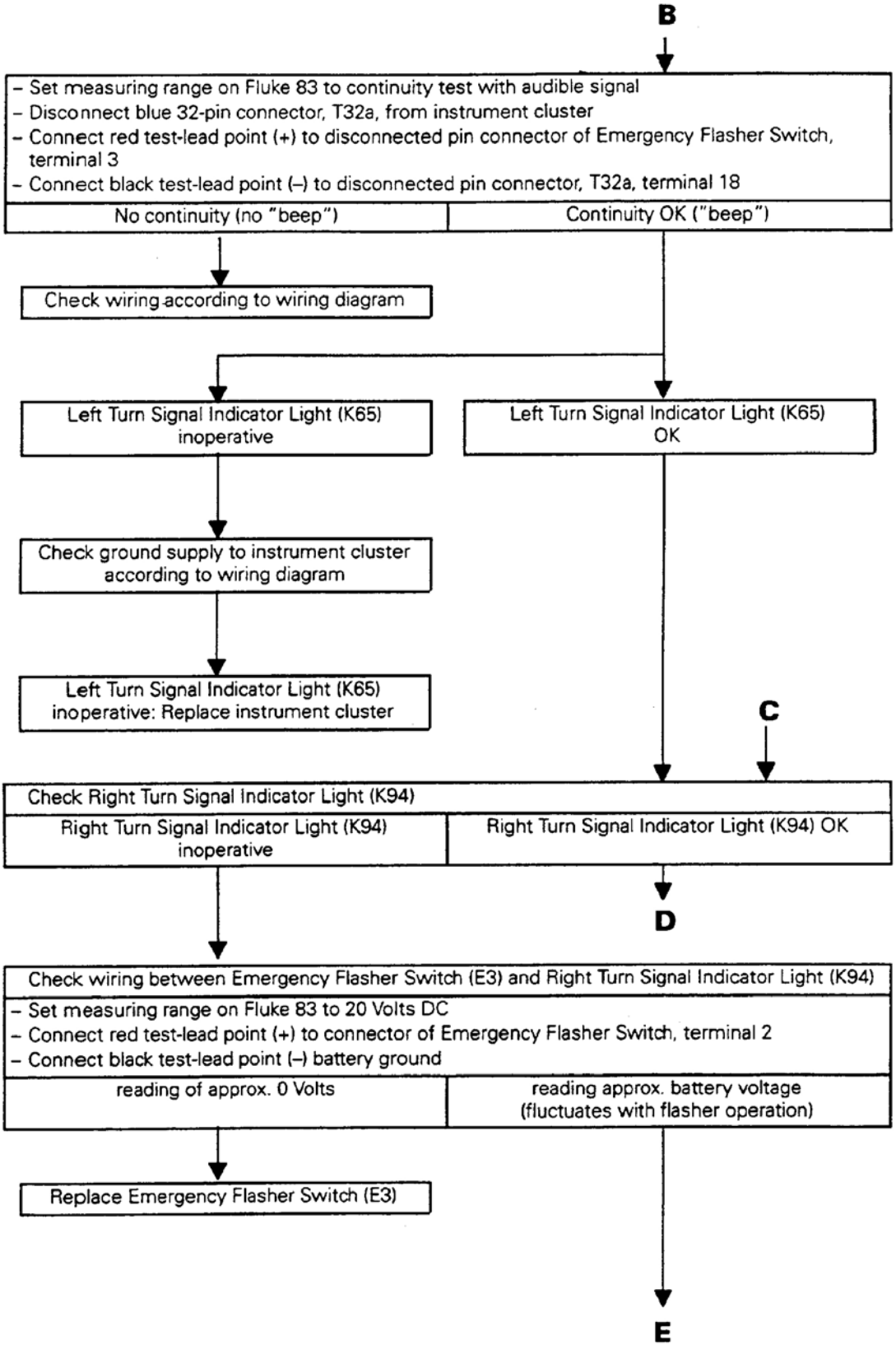


Fig. 4: Removing Shear Head Bolts Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove screws -1-.
- Remove cover -A-.


B
– Set measuring range on Fluke 83 to continuity test with audible signal
– Disconnect blue 32-pin connector, T32a, from instrument cluster
– Connect red test-lead point (+) to disconnected pin connector of Emergency Flasher Switch, terminal 3
– Connect black test-lead point (–) to disconnected pin connector, T32a, terminal 18
No continuity (no "beep")
Continuity OK ("beep")
Check wiring according to wiring diagram
Left Turn Signal Indicator Light (K65) inoperative
Left Turn Signal Indicator Light (K65) OK
Check ground supply to instrument cluster according to wiring diagram
Left Turn Signal Indicator Light (K65) inoperative: Replace instrument cluster
C
Check Right Turn Signal Indicator Light (K94)
Right Turn Signal Indicator Light (K94) inoperative
Right Turn Signal Indicator Light (K94) OK
D
Check wiring between Emergency Flasher Switch (E3) and Right Turn Signal Indicator Light (K94)
– Set measuring range on Fluke 83 to 20 Volts DC
– Connect red test-lead point (+) to connector of Emergency Flasher Switch, terminal 2
– Connect black test-lead point (–) battery ground
reading of approx. 0 Volts
reading approx. battery voltage (fluctuates with flasher operation)
Replace Emergency Flasher Switch (E3)
E

G00416937

Fig. 5: Removing Screws And Lower Steering Column Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove bolts -1- from universal joint.
- Pull universal joint off steering gear.

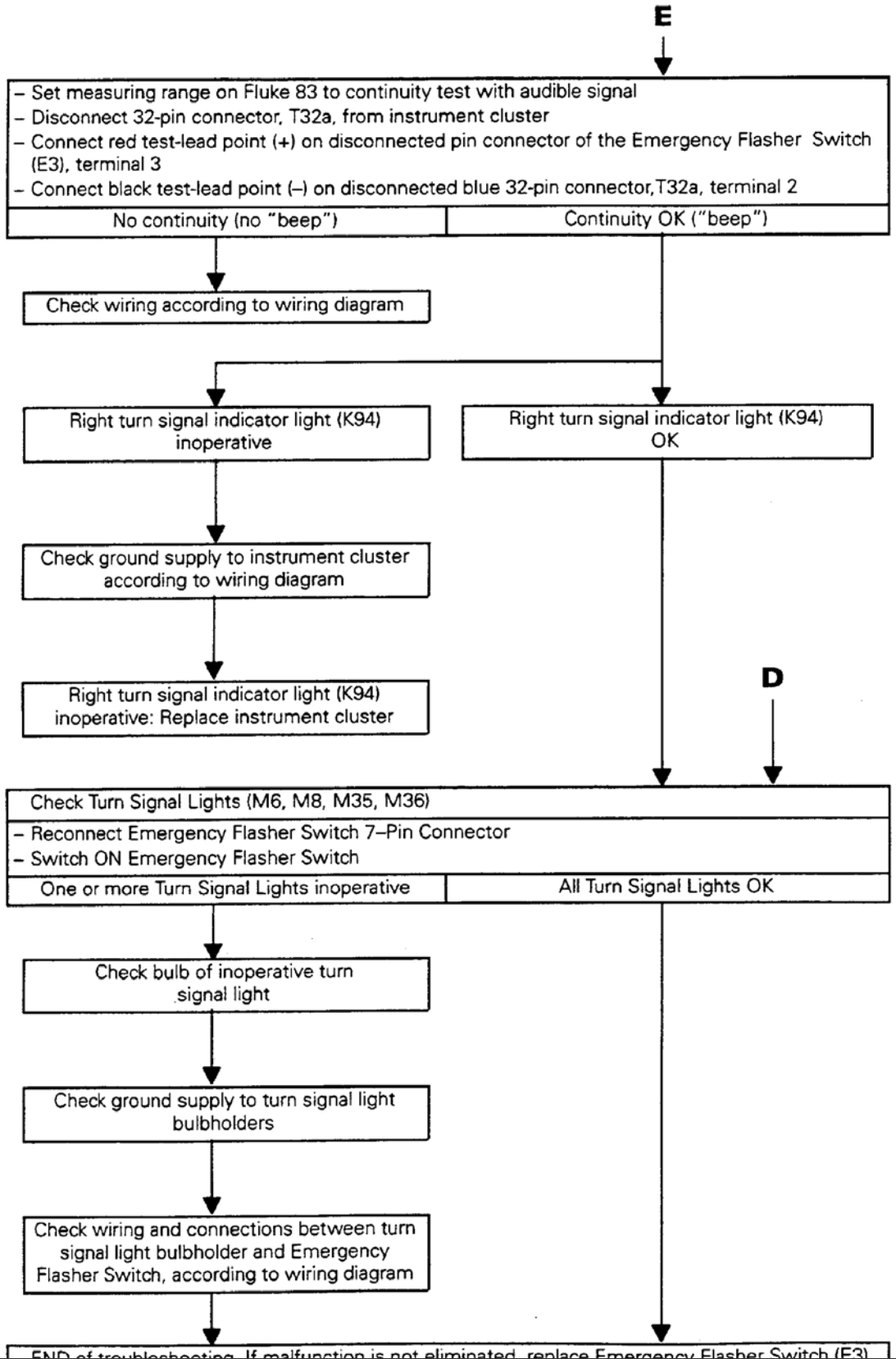

E
– Set measuring range on Fluke 83 to continuity test with audible signal
– Disconnect 32-pin connector, T32a, from instrument cluster
– Connect red test-lead point (+) on disconnected pin connector of the Emergency Flasher Switch (E3), terminal 3
– Connect black test-lead point (–) on disconnected blue 32-pin connector, T32a, terminal 2
No continuity (no "beep")
Continuity OK ("beep")
Check wiring according to wiring diagram
Right turn signal indicator light (K94) inoperative
Right turn signal indicator light (K94) OK
Check ground supply to instrument cluster according to wiring diagram
Right turn signal indicator light (K94) inoperative: Replace instrument cluster
D
Check Turn Signal Lights (M6, M8, M35, M36)
– Reconnect Emergency Flasher Switch 7–Pin Connector
– Switch ON Emergency Flasher Switch
One or more Turn Signal Lights inoperative
All Turn Signal Lights OK
Check bulb of inoperative turn signal light
Check ground supply to turn signal light bulbholders
Check wiring and connections between turn signal light bulbholder and Emergency Flasher Switch, according to wiring diagram

Fig. 6: Removing Universal Joint Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing steering column before removal

An assembly aid is required so that the upper and lower parts of the steering column do not pull apart when pulling off steering gear.

If the upper and lower parts of the steering column are pulled too far apart or pushed too close together the splines will be separated .

It is possible that rattling noises may occur later on if splines are not in their original installation position .

- Push or pull steering column together or apart until the hole is visible.
- Insert for example a clip in the hole -arrow-.

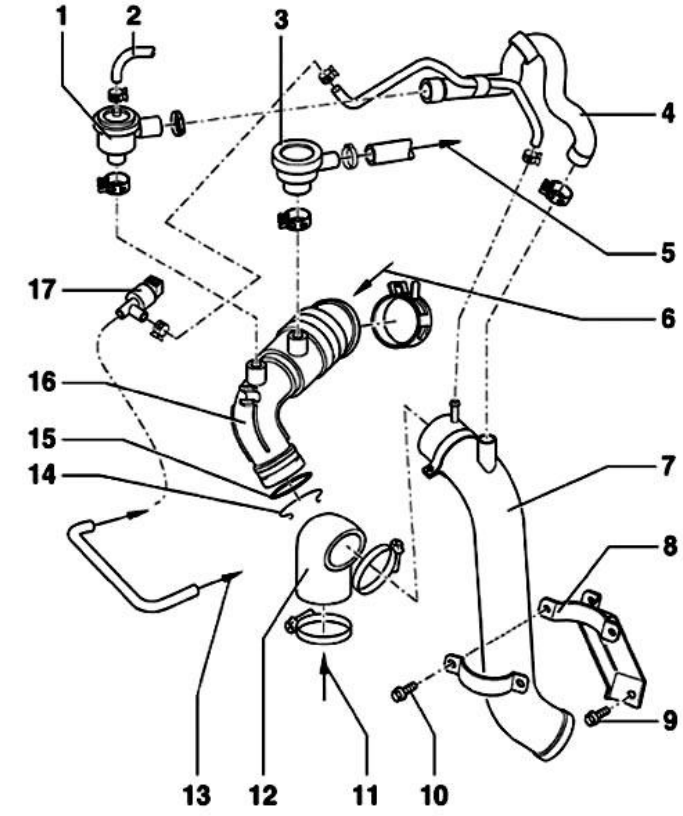

1 - Charge pressure bypass valve
2 - Connecting pipe/hose
3 - Pressure regulator valve
4 - Connecting pipe/hose
5 - To crankcase ventilation
6 - From air filter
7 - Upper air guiding duct
8 - Bracket
9 - 25 Nm
10 - 10 Nm
11 - From exhaust turbocharger-exhaust connection
12 - Connecting pipe/hose
13 - Connecting pipe/hose
14 - Circlip
15 - O-ring
16 - Intake hose
17 - Wastegate Bypass Regulator Valve -N75-
G03257745

Fig. 7: Inserting Clip In Steering Column Hole
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with the steering column from the company Nacam up to 01.00

- Remove nut -3-.
- Pull out bolt -1-.
- Remove bolts -2- and take out steering column.

NOTE: The following list refers to items in Fig. 8 .

1. **Hex bolt**
2. **Hex bolt**
   - 22 N.m (16.2 ft lb)
3. **Hex nut**
   - 10 N.m (7 ft lb)
4. **Cross member for steering column**

Fig. 8: Removing Steering Column From Cross Member (Manufactured By Nacam)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with the steering column from the company Presta, from 02.00 and on

- Remove nut -3-.
- Pull out bolt -1-.
- Remove bolts -2- and take out steering column.

NOTE: The following list refers to items in Fig. 9 .

1. **Hex bolt**
2. **Hex bolt**
   - 22 N.m (16.2 ft lb)
3. **Hex nut**
   - 10 N.m (7 ft lb)
4. **Cross member for steering column**

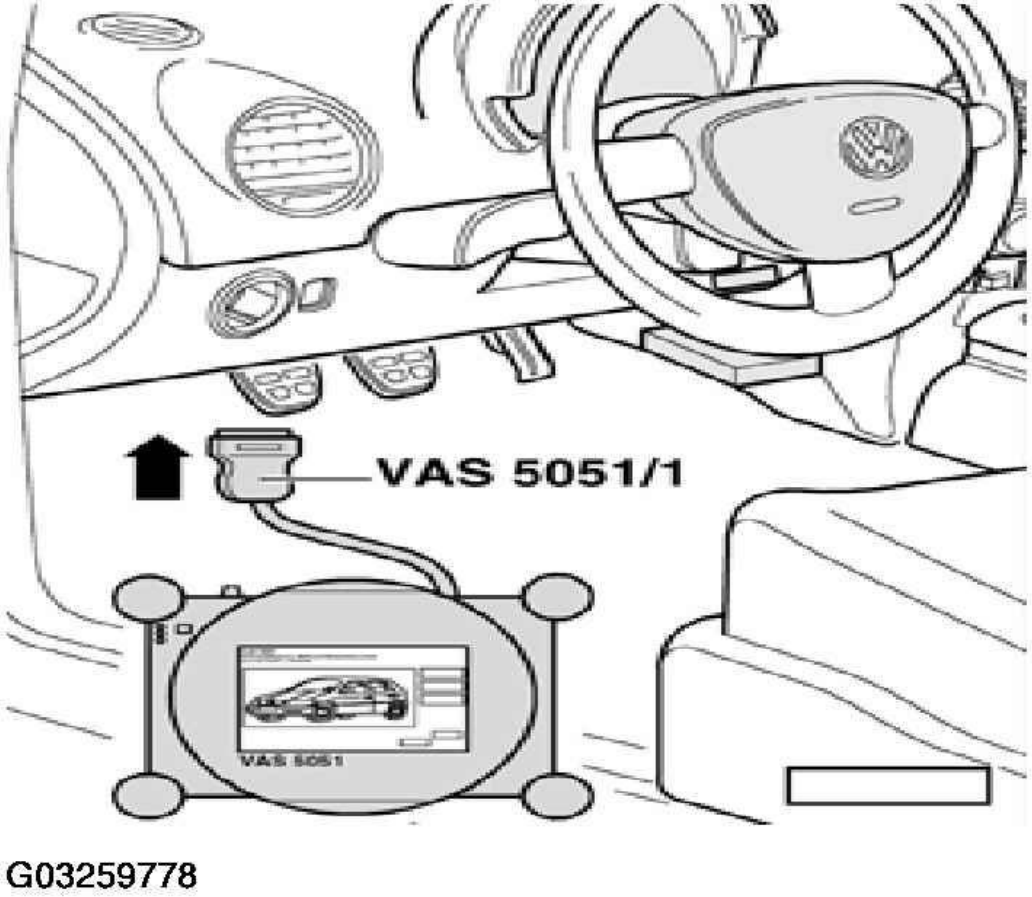


Fig. 9: Removing Steering Column From Cross Member (Manufactured By Presta)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing trim for steering column switch

- Remove bolts/screws -1-.
- Remove height and reach adjustment handle -5-.
- Remove bolts -2-, -3- and -4-.

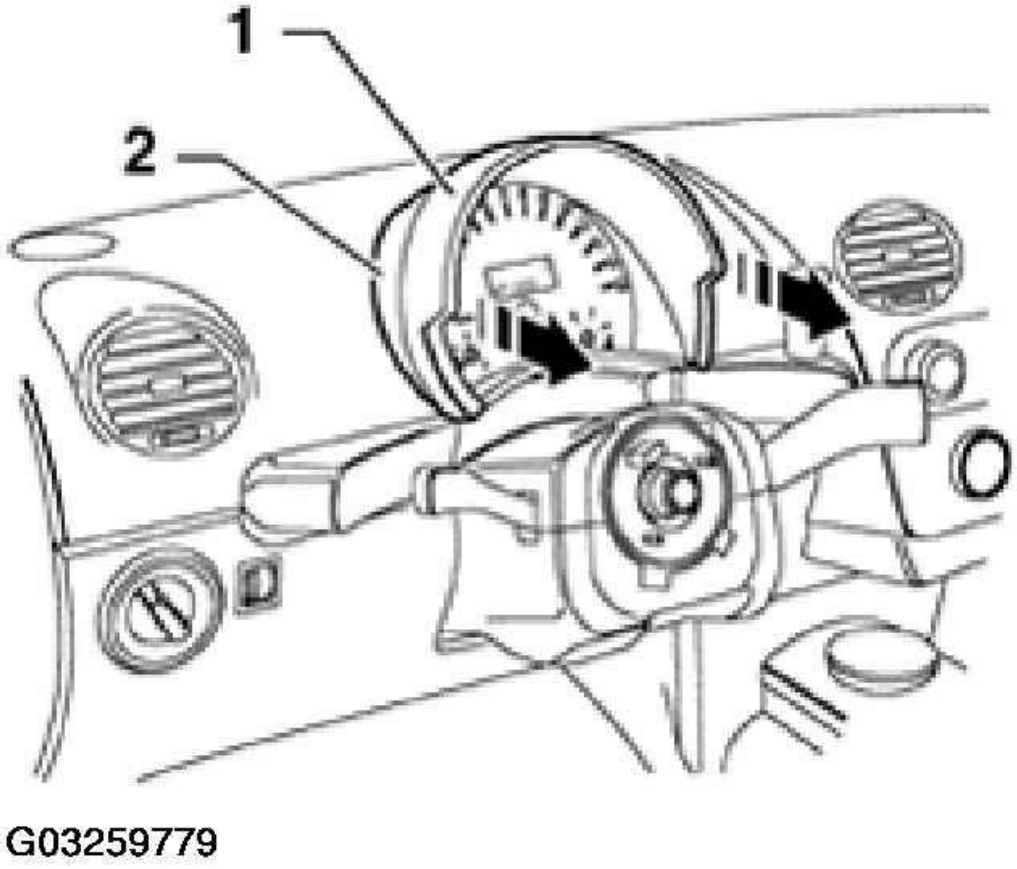


Fig. 10: Removing Trim For Steering Column Switch
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove steering column switch lower trim
- Remove steering column switch upper trim -1-

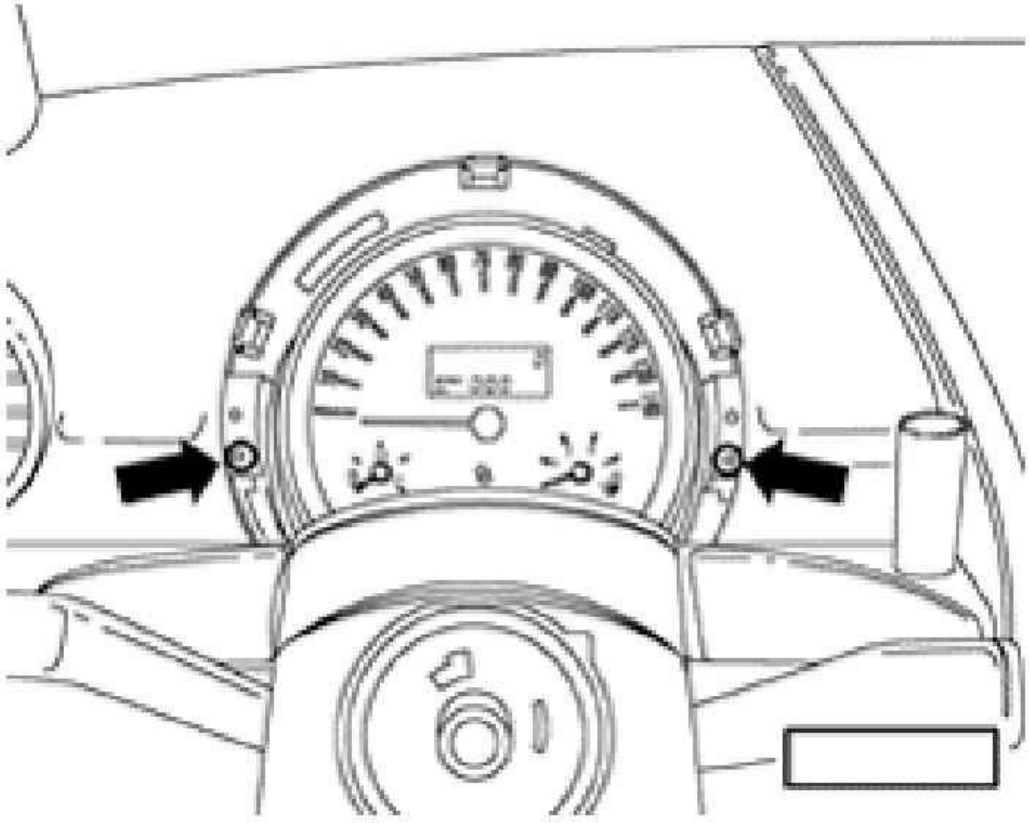


Fig. 11: Removing Steering Column Switch Upper Trim
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing steering column

Vehicles with the steering column from the company Nacam up to 01.00

New steering columns, which are delivered as spare parts, are secured with a transportation securing device -6-.

This transportation device 6 must be removed after installing steering column in vehicle .

The shear head bolt -10- and the roller -11- must be installed on new steering columns, which have been supplied as a spare part .

NOTE: The following list refers to items in Fig. 12 .

- Tighten shear head bolt -10- until head shears off.
- Install steering column with preassembled steering lock housing to cross member.
- Install hex bolts -5-.
- Now insert hex bolt -12-.
- Install nut -13- and tighten to 10 N.m (7.4 in lb).
- Now tighten bolts -5- to 25 N.m (18 ft lb).
- Now pull out transportation securing device -6-.
- Install universal joint shaft onto steering pinion -9-.
- Tighten bolt 8 to 30 N.m (22 ft lb).

NOTE: The following list refers to items in Fig. 12 .

1. **Cross member for steering column**
2. **Steering column**
3. **Screw**
4. **Handle**
5. **Hex. bolts**
    - 25 N.m (18 ft lb)
6. **Transportation securing device**
7. **Steering column drive shaft**
8. **Hex. bolt**
    - 30 N.m (22 ft lb)
9. **Steering gear pinion**
10. **Shear head bolt**
11. **Roller**
12. **Hex bolt**
13. **Hex. nut**
    - 10 N.m (7.4 in lb)

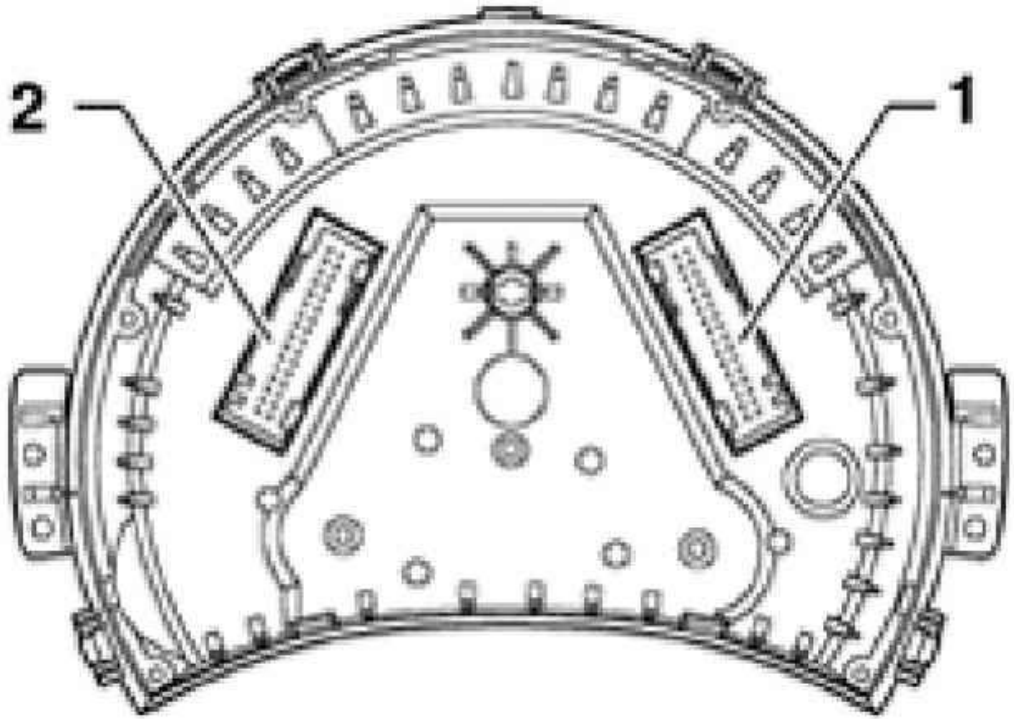


Fig. 12: Installing Steering Column From Cross Member (Manufactured By Nacam)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with the steering column from the company Presta from 02.00 and up

New steering columns, which are delivered as spare parts, are secured with a transportation securing device -6-.

This transportation device 6 must be removed after installing steering column in vehicle .

The shear head bolt -10- and the roller -11- must be installed on new steering columns, which have been supplied as a spare part .

NOTE: The following list refers to items in Fig. 13 .

- Tighten shear head bolt -10- until head shears off.
- Install steering column with preassembled steering lock housing to cross member.
- Install bolts -5-.

- Now insert hex bolt -12-.
- Install nut -13- and tighten to 10 N.m (7.4 ft lb).
- Now tighten bolts -5- to 25 N.m (18.4 ft lb).
- Now pull out transportation securing device -6-.
- Install universal joint shaft onto steering pinion.
- Tighten bolt -8- to 30 N.m.

NOTE: The following list refers to items in Fig. 13 .

1. **Cross member for steering column**
2. **Steering column**
3. **Bolts**
4. **Handle**
5. **Hex bolt**
    - 25 N.m (18 ft lb)
    - Inserted with locking fluid
        - Use locking fluid D 000 600
6. **Transportation securing device**
7. **Steering column universal joint shaft**
8. **Hex bolt**
    - 30 N.m (22 ft lb)
9. **Steering gear pinion**
10. **Shear head bolt**
11. **Roller**
12. **Hex bolt**
13. **Hex nut**
    - 10 N.m (7.4 in lb)

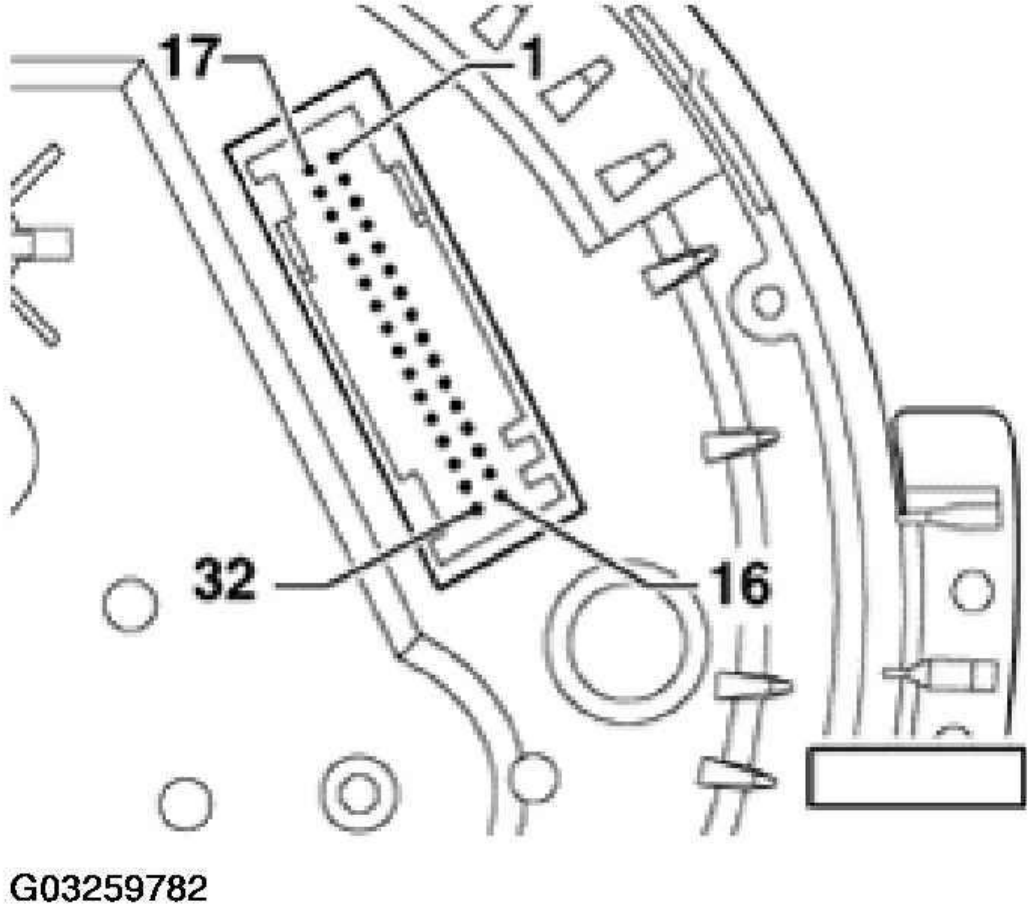


Fig. 13: Installing Steering Column From Cross Member (Manufactured By Presta)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Continued for all vehicles

The ignition key removal lock cable must also be hooked-on, vehicles with an automatic transmission. See **HOOKING** .

- Installing steering lock switch.

  See **STEERING COLUMN SWITCHES, REMOVING AND INSTALLING** .

- Install steering angle sensor -G85-.

  See **STEERING ANGLE SENSOR -G85-, REMOVING AND INSTALLING** .

The basic setting for steering angle sensor -G85- must be checked after the following assembly work:

- When the steering angle sensor -G85- has been removed or replaced,
- After removing or replacing the steering column;
- After removing or replacing the steering column switch;
- After removing or replacing the steering lock housing;
- When steering wheel is not in straight-ahead position.

Check basic setting for steering angle sensor -G85-

- Connect Vehicle Diagnosis, Testing and Information System VAS 5051.
- Select in display "Running gear (Repair group 01; 40 ... 48)".
- Select in display "Brake system".
- Select in display "01 Self-diagnosis-capable systems ...".
- Select in display "Anti-locking brake system ...".
- Select in display "Functions".
- Select in display "Basic setting, Steering angle sensor -G85-".
- Install steering column switch trim.

  See **INSTRUMENT PANEL, REMOVING AND INSTALLING** .

- Install steering wheel.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

- Install airbag unit.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

WARNING: When connecting battery make sure that no one is in the vehicle!

STEERING COLUMN FOR DAMAGE, CHECKING

Visual check

- Check all steering column parts for damage.

  Replace complete steering column if damaged.

Functional check

Requirements:

- Steering column universal joint pulled off steering gear.

- Check that steering column turns easily without catching.
- Check that steering column can be adjusted for tilt and telescopic.
- Check gap -dimension a-.

  Dimension a; Maximum 23 mm (0.906 in.)

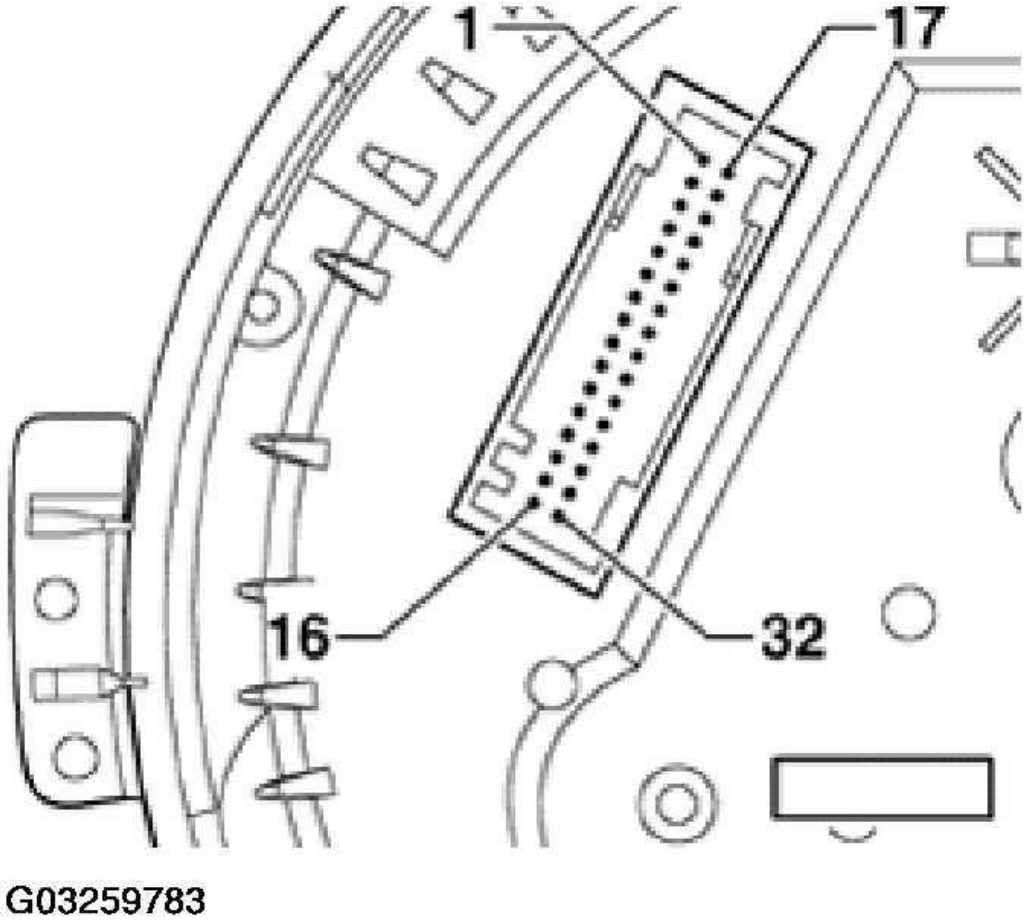


Fig. 14: Checking Steering Column Gap
Courtesy of VOLKSWAGEN OF AMERICA, INC.

If during one of these checks the specifications are not attained the steering column is damaged.

- Replace steering column in this case.

STEERING LOCK HOUSING, REMOVING AND INSTALLING

Removing

- Remove steering wheel.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

  Lower and upper steering column trim removed; see **REMOVING TRIM FOR STEERING COLUMN SWITCH** .

- Remove bolt for steering column switch -arrow- and remove steering column switch.

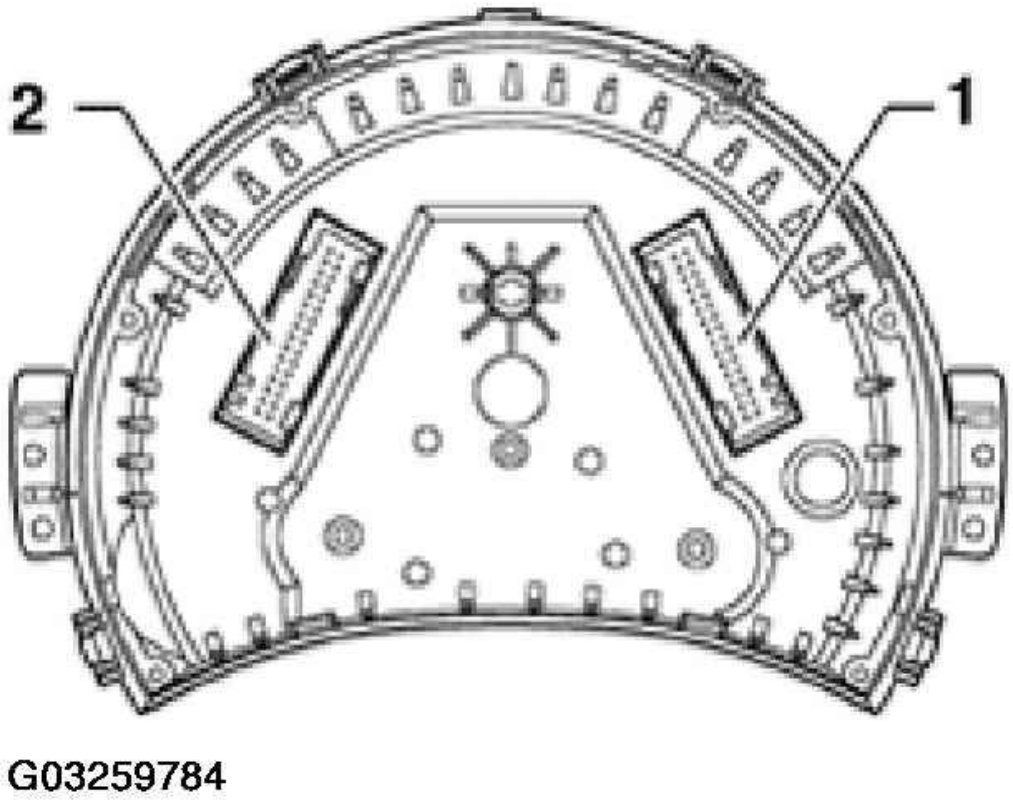


Fig. 15: Removing Steering Column Switch Bolt
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove plastic cover over shear bolts.

  The ignition key removal lock cable must be unhooked additionally on vehicles with automatic transmission. See **LOCKING CABLE FOR IGNITION WITH KEY WITHDRAWAL LOCK, REMOVING AND INSTALLING**

- Chisel off shear head bolts with a suitable chisel.

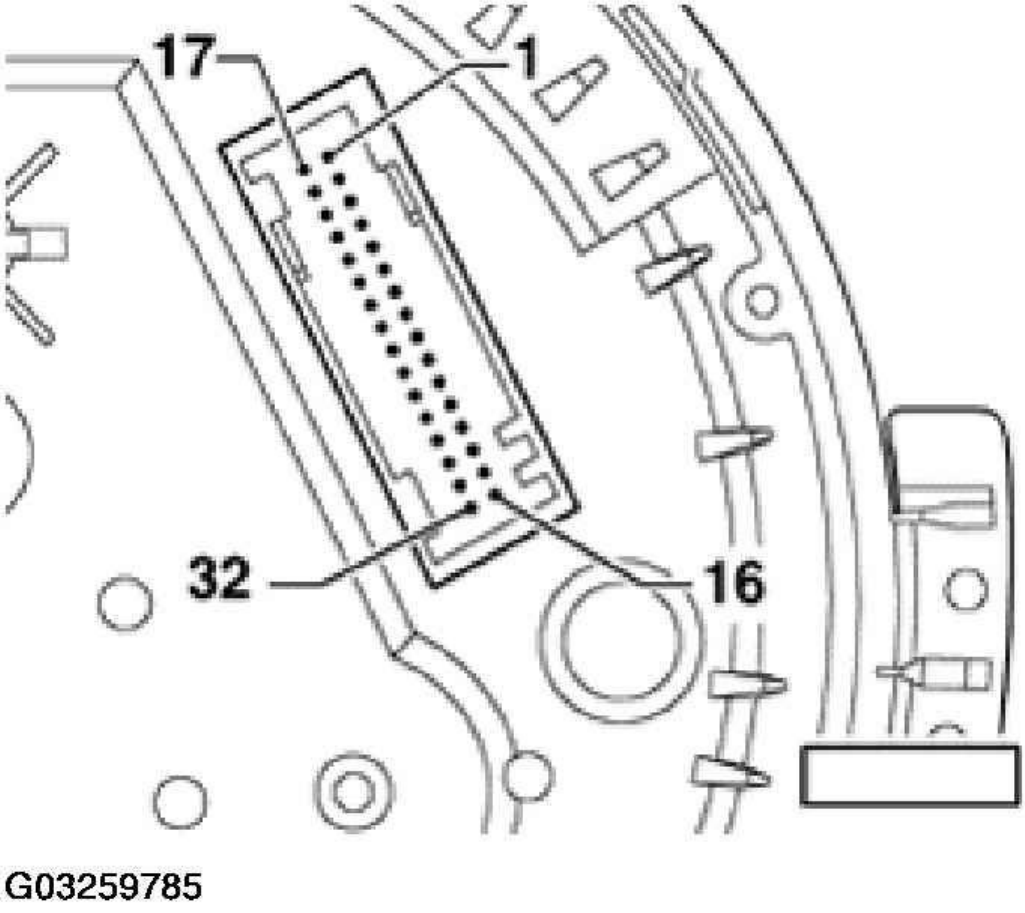


Fig. 16: Shearing Head Bolts With Suitable Chisel
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing and installing ignition/starter switch/ lock cylinder

See **LOCK CYLINDER, REMOVING AND INSTALLING** .

Installing

Installing ignition switch/lock cylinder

See **LOCK CYLINDER, REMOVING AND INSTALLING** .

- Reconnect connector for ignition starter switch.
- Attach ignition key removal lock cable if necessary; only with automatic transmissions. See **HOOKING** .
- Install new shear bolts.
- Tighten shear head bolts until head shears off.
- Install steering angle sensor -G85-.

  See **STEERING ANGLE SENSOR -G85-, REMOVING AND INSTALLING** .

- Install steering column switch trim.

  See **INSTRUMENT PANEL, REMOVING AND INSTALLING** .

- Install steering wheel.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

- Install airbag unit.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

WARNING: When connecting battery make sure that no one is in the vehicle!

STEERING COLUMN CROSS MEMBER, NEW BEETLE SEDAN, ASSEMBLY OVERVIEW

NOTE: The following list refers to items in Fig. 17 .

1. **Cross member for steering column**
2. **Adjustment bracket**
3. **Hex bolt**
   - 25 N.m (18.4 ft lb)
4. **Strut, right**
5. **He bolt**
   - 25 N.m (18.4 ft lb)
6. **Speed nut**

7. **Strut, left**
8. **Steering column**
9. **Steering lock housing**
10. **Bulkhead connection**
11. **Hex nut**
    - 25 N.m (18.4 ft lb)
12. **Hex screw**
    - 25 N.m (18.4 ft lb)
13. **Support**

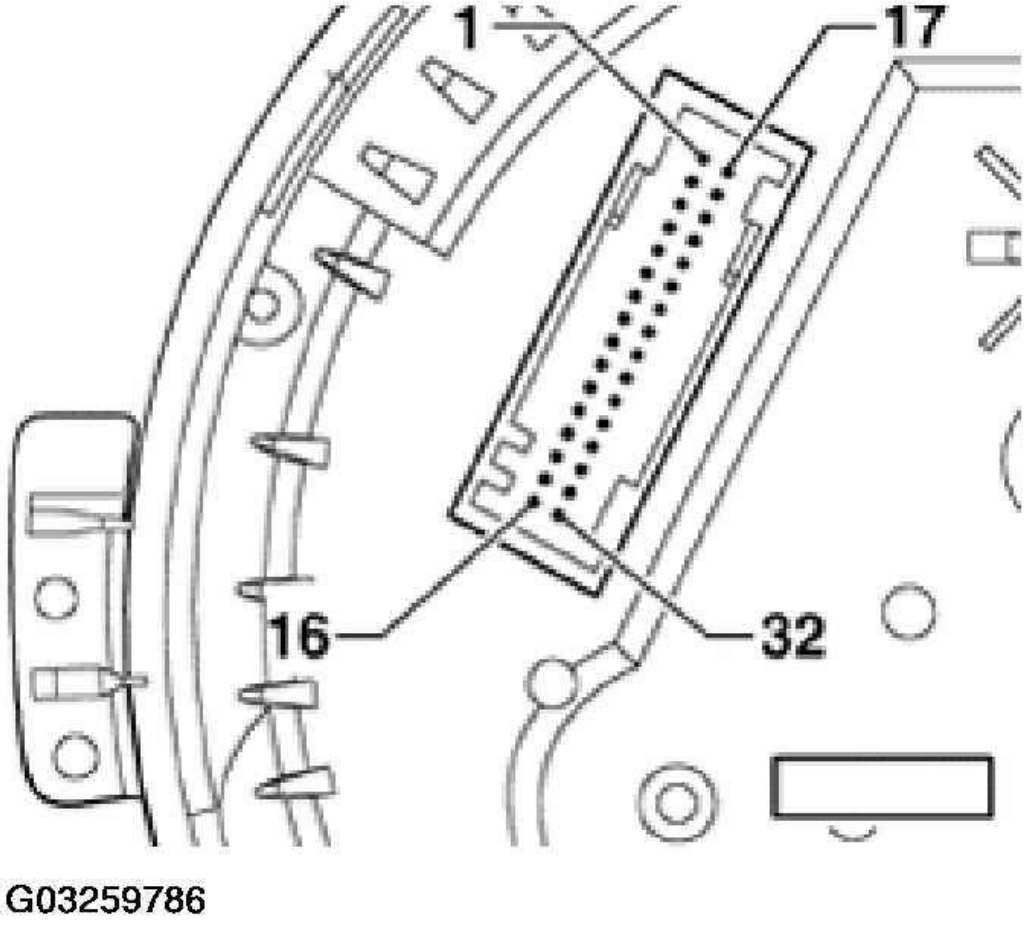


Fig. 17: View Of Steering Column Cross Member (New Beetle Sedan)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

STEERING COLUMN CROSS MEMBER, NEW BEETLE CONVERTIBLE, ASSEMBLY OVERVIEW

NOTE: The following list refers to items in Fig. 18 .

1. **Cross member for steering column**
2. **Adjustment bracket**
3. **Hex bolt**
   - 25 N.m (18.4 ft lb)
4. **Strut, right**
5. **Hex bolt**
   - 25 N.m (18.4 ft lb)
6. **Speed nut**
7. **7 Strut, left**
8. **Steering column**
9. **Steering lock housing**
10. **Installing bracket**
11. **Hex nut**
    - 23 N.m (17 ft lb)
12. **Multi-point socket head bolt**
    - 23 N.m (17 ft lb)
13. **Bulkhead connection**
14. **Hex nut**
    - 25 N.m (18.4 ft lb)
15. **Hex bolt**
    - 25 N.m (18.4 ft lb)
16. **Support**
17. **Hex nut**
    - 25 N.m (18.4 ft lb)
18. **Frequence strut**

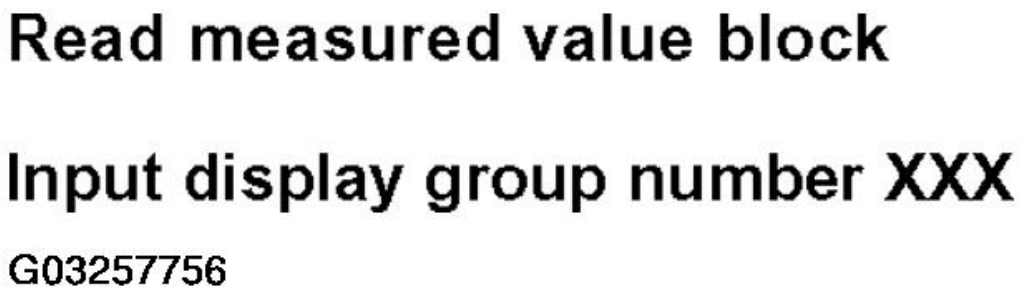


Fig. 18: View Of Steering Column Cross Member (New Beetle Convertible)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

DIFFERENT STEERING COLUMNS

The steering column -A- is from the company Nacam was used until up to 01.00.

The steering column -B- is from the company Presta is used since from 02.00 and on

The function of the reach and rake adjustment is identical in both steering columns.

Both variants are supplied as spare parts.

When replacing a steering column, use only a steering column from the same manufacturer.

Before removing the steering column, check which version is installed in the vehicle.

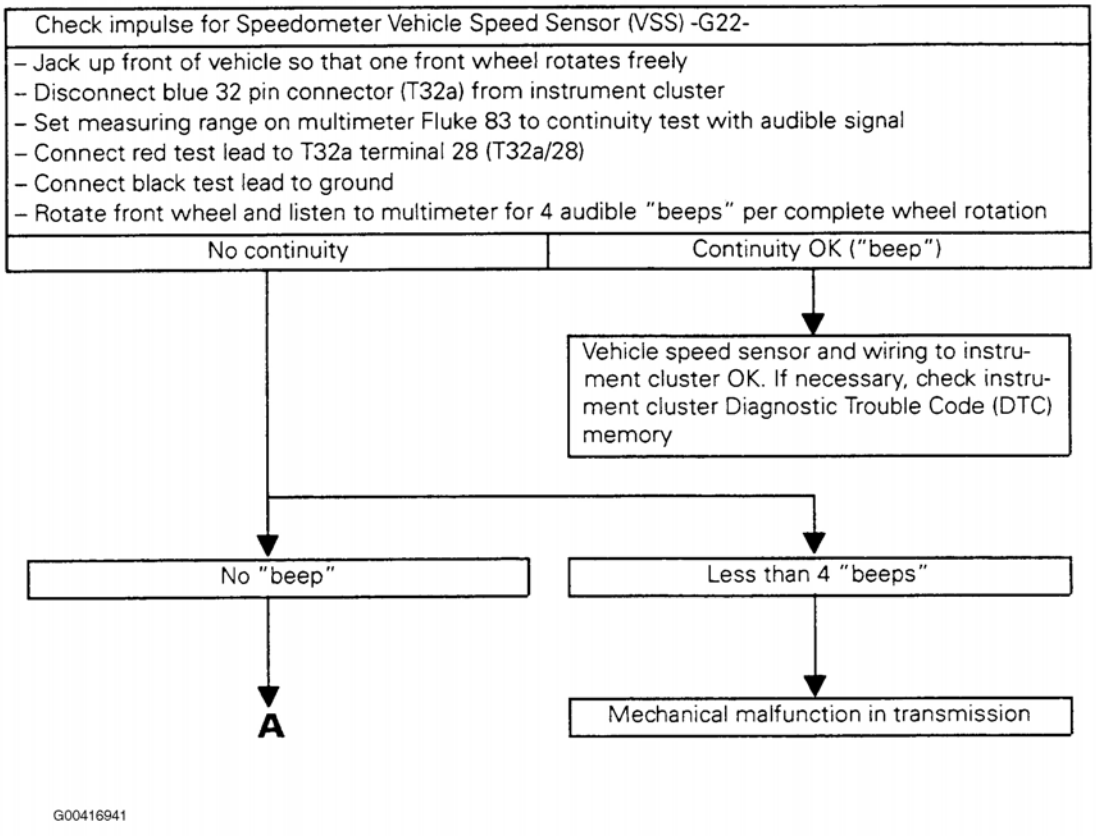

Check impulse for Speedometer Vehicle Speed Sensor (VSS) -G22-
– Jack up front of vehicle so that one front wheel rotates freely
– Disconnect blue 32 pin connector (T32a) from instrument cluster
– Set measuring range on multimeter Fluke 83 to continuity test with audible signal
– Connect red test lead to T32a terminal 28 (T32a/28)
– Connect black test lead to ground
– Rotate front wheel and listen to multimeter for 4 audible "beeps" per complete wheel rotation
No continuity
Continuity OK ("beep")
Vehicle speed sensor and wiring to instrument cluster OK. If necessary, check instrument cluster Diagnostic Trouble Code (DTC) memory
No "beep"
Less than 4 "beeps"
A
Mechanical malfunction in transmission
G00416941

Fig. 19: Identifying Different Steering Columns (Nacam And Presta)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Identifying the steering columns

A. **Steering column**

Manufacturer: Company Nacam up to 01.00

NOTE: The following list refers to items in Fig. 20 .

1. **Transportation securing device**
   - After steering column is installed remove
2. **Steering column**

   The steering column is not visible in this area

3. **Steering column drive shaft**
4. **Hex bolt**
   - 25 N.m (18.4 ft lb)

- Installed without locking fluid

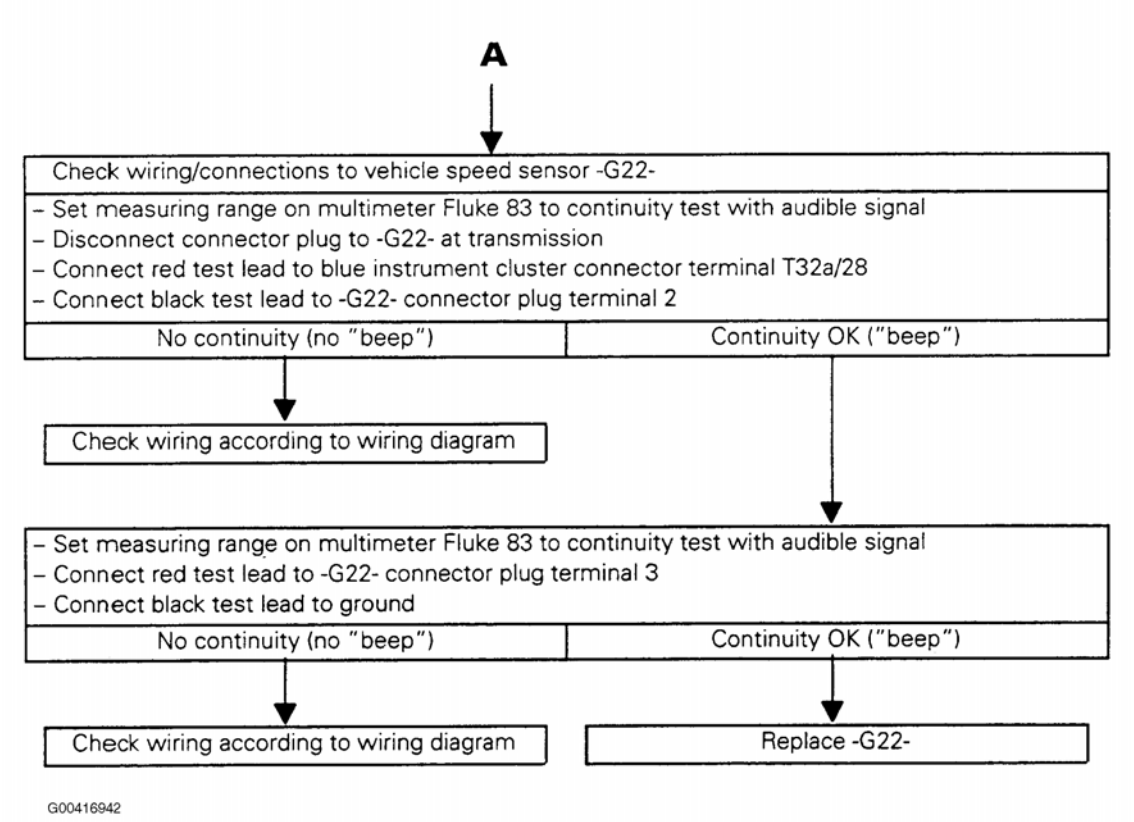

A
Check wiring/connections to vehicle speed sensor -G22-
– Set measuring range on multimeter Fluke 83 to continuity test with audible signal
– Disconnect connector plug to -G22- at transmission
– Connect red test lead to blue instrument cluster connector terminal T32a/28
– Connect black test lead to -G22- connector plug terminal 2
No continuity (no "beep")
Continuity OK ("beep")
Check wiring according to wiring diagram
– Set measuring range on multimeter Fluke 83 to continuity test with audible signal
– Connect red test lead to -G22- connector plug terminal 3
– Connect black test lead to ground
No continuity (no "beep")
Continuity OK ("beep")
Check wiring according to wiring diagram
Replace -G22-
G00416942

Fig. 20: Identifying Nacam Steering Column up to 01.00
Courtesy of VOLKSWAGEN OF AMERICA, INC.

B. **Steering column**

Manufacturer: Company Presta 02.00 "INDICATOR"

NOTE: The following list refers to items in Fig. 21 .

1. **Transportation securing device**
   - After steering column is installed remove
2. **Steering column**

   The lower part of the steering column is visible

3. **Steering column drive shaft**
4. **Hex bolt**
   - 25 N.m (18.4 ft lb)
   - Inserted with locking fluid

- Use locking fluid D 000 600

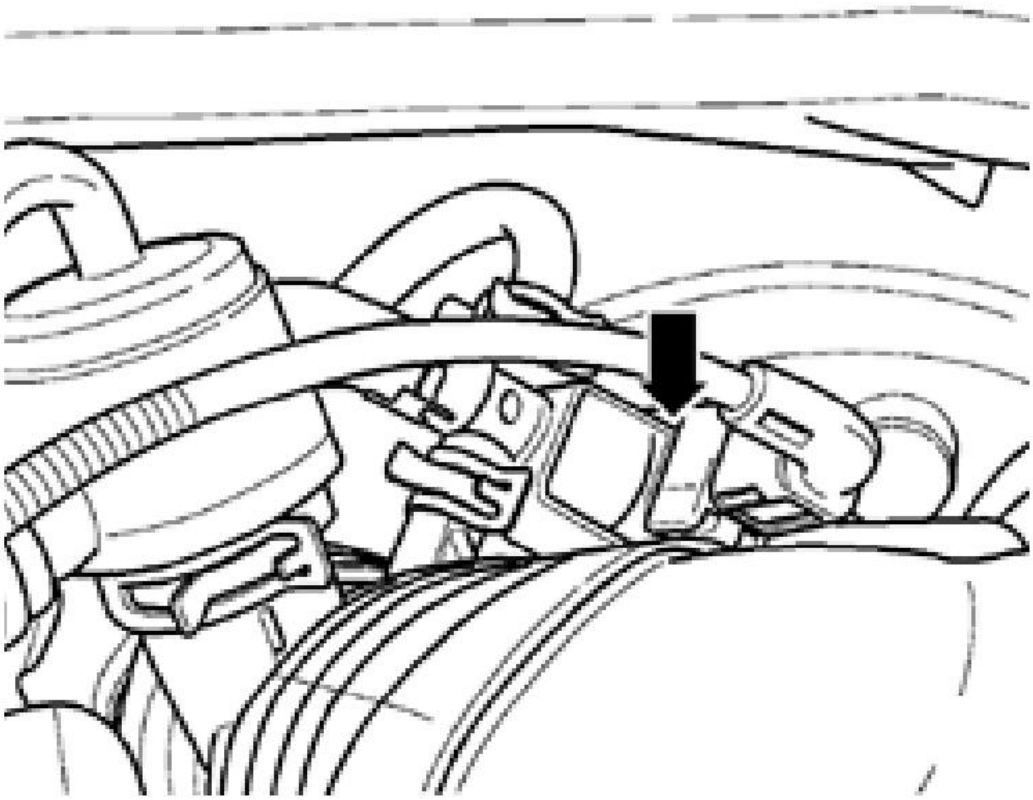


Fig. 21: Identifying Presta Different Steering Column from 02.00 and on
Courtesy of VOLKSWAGEN OF AMERICA, INC.

LOCKING CABLE FOR IGNITION WITH KEY WITHDRAWAL LOCK, REMOVING AND INSTALLING

Vehicles with automatic transmission only

Adjusting locking cable

For 01M. See **LOCKING CABLE** .

For 09G. See **LOCKING CABLE** .

For 02E. See **LOCKING CABLE** .

Unhooking

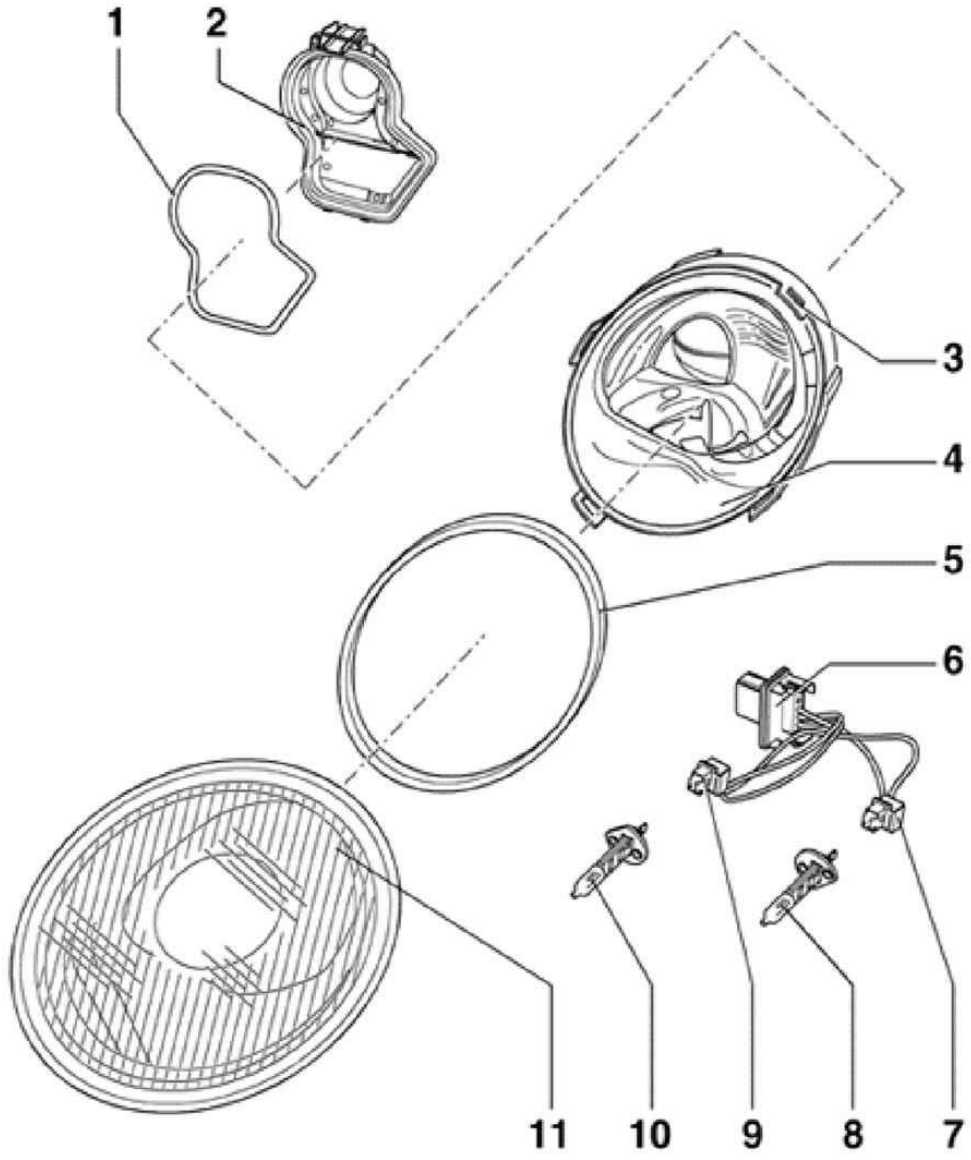
- Remove steering wheel.

  See appropriate AIR BAG RESTRAINT SYSTEMS article.

- Removing trim for steering column switch

  See **INSTRUMENT PANEL, REMOVING AND INSTALLING** .

- Move selector lever to position "P", if necessary.
- Turn ignition key -A- to position "ignition on".
- Press clip -1- upward or downward, depending on installation position, simultaneously pulling out locking cable -2-.



1 - Gasket

2 - Cover

3 - Retainers

4 - Headlight housing

5 - Gasket

6 - Harness connector

7 - Electrical connector for high beam bulb

8 - High beam bulb

9 - Electrical connector for low beam bulb

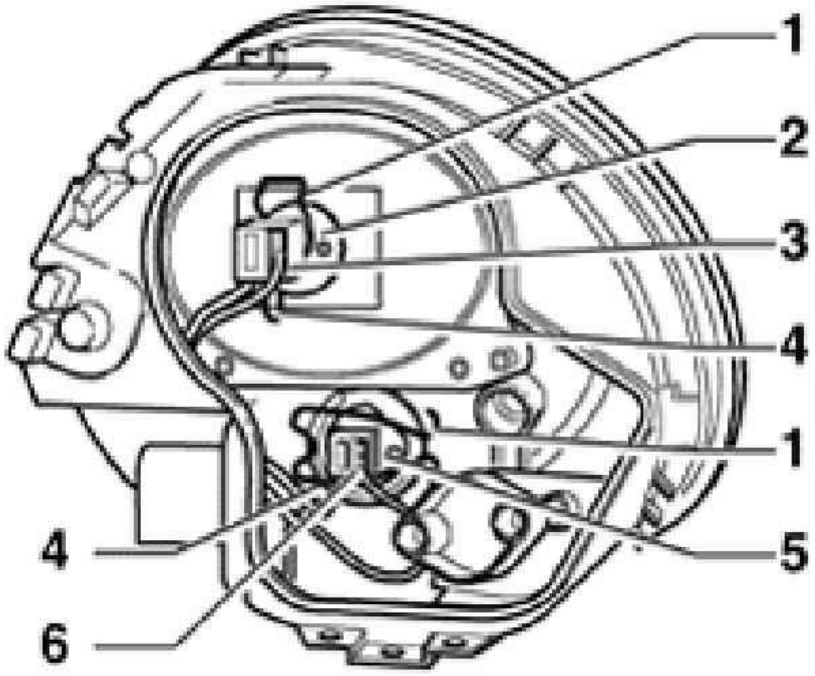
10 - Low beam bulb

11 - Headlight glass

Fig. 22: Turning Ignition Key To Position "Ignition On" To Remove Locking Cable For Ignition
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Hooking

- Move selector lever to position "P".
- Turn ignition key -A- to position "ignition on".
- Push locking cable -2- into steering lock housing until clip -1- engages.



1 - Retaining clip

2 - High beam bulb

3 - Electrical connector for high beam

4 - Locating lugs

5 - Low beam bulb

6 - Electrical connector for low beam

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Fig. 23: Connecting Locking Cable Into Steering Lock Housing

Courtesy of VOLKSWAGEN OF AMERICA, INC.

IGNITION KEY LOCK, CHECKING

- Turn ignition key to position "Ignition on".
- Step on brake.

Must be possible to move selector lever out of "Park" position.

If this is not possible, the locking cable must be adjusted;

For 01M. See **LOCKING CABLE** .

For 09G. See **LOCKING CABLE** .

For 02E. See **LOCKING CABLE** .

It must only be possible to remove the ignition key when selector lever is in "Park" position!

When ignition key is in position "Ignition off" it must not be possible to move selector lever out of "Park" position!

POWER STEERING, SERVICING

POWER STEERING GEAR, REMOVING AND INSTALLING

Special and equipment

- 3094 Hose pipe clip
- V.A.G 1331 Torque wrench
- V.A.G 1332 Torque wrench
- V.A.G 1383 A Engine/transmission jack with universal transmission support V.A.G 1359/2

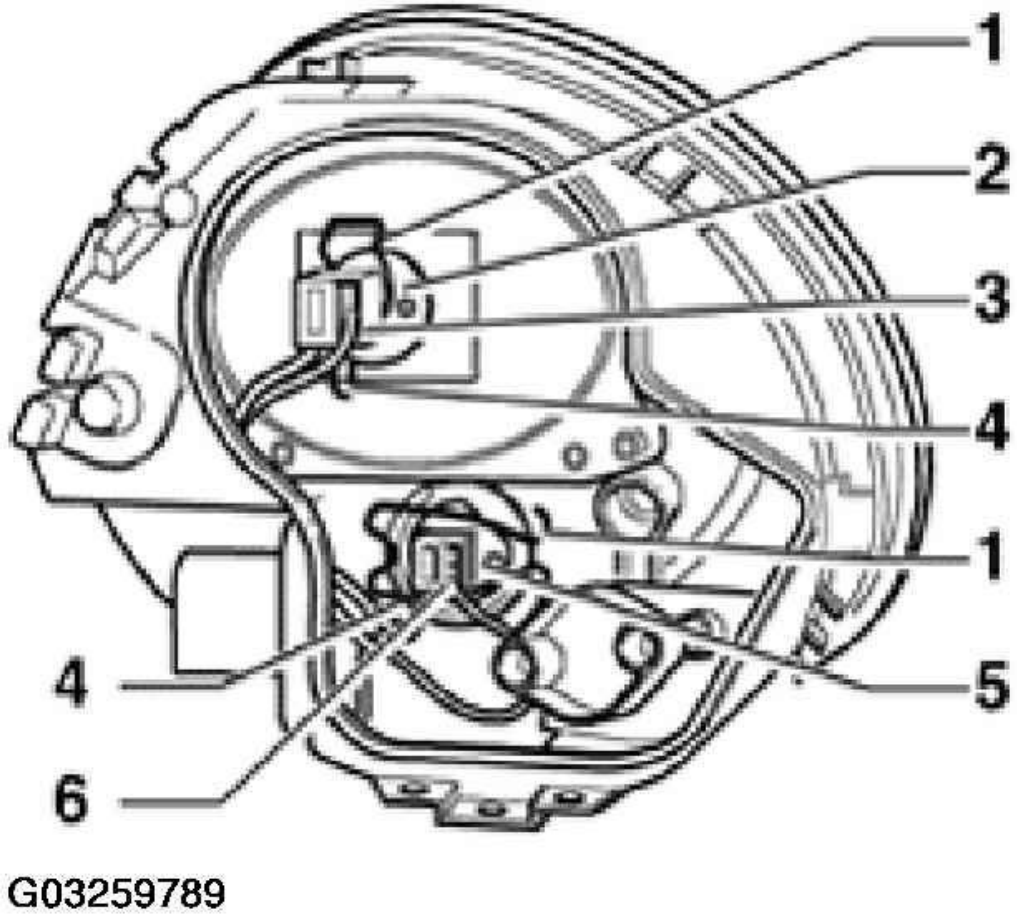

Fig. 24: Identifying Special Tool And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Instructions when working on the power steering gear

NOTE:

- **Absolute cleanliness is required when working on the power steering.**
- **Thoroughly clean all unions and the adjacent areas before disconnecting.**
- **Place parts on a clean surface and cover if not reinstalling immediately.**
- **Do not use fluffy rags that could leave line.**
- **Only unpack replacement parts immediately prior to installation.**
- **Only use genuine packed parts.**

Removing

- Remove screws -1-.
- Remove cover -A-.

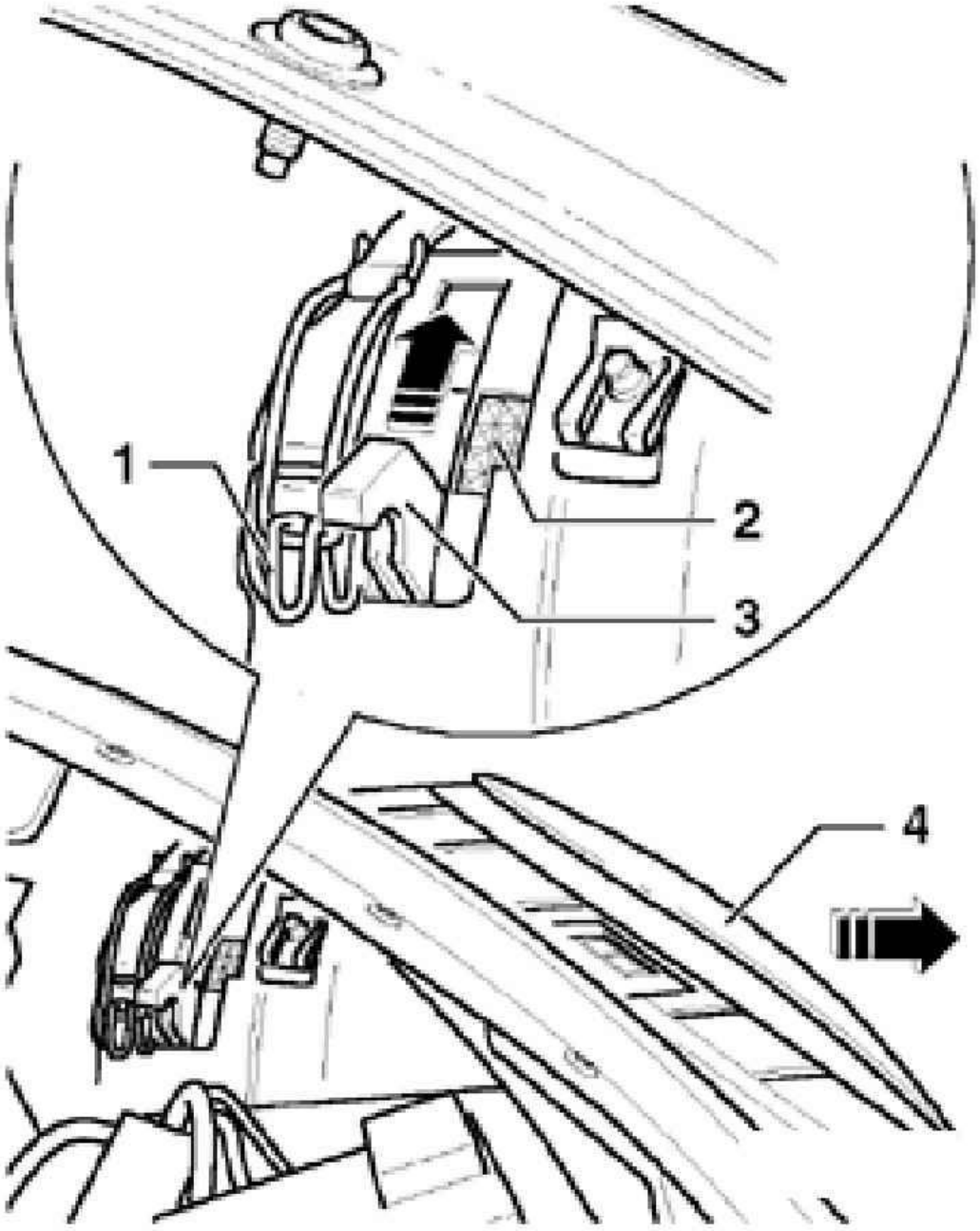

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Fig. 25: Removing Screws And Steering Column Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove bolt -1- from universal joint.
- Pull universal joint off steering gear.

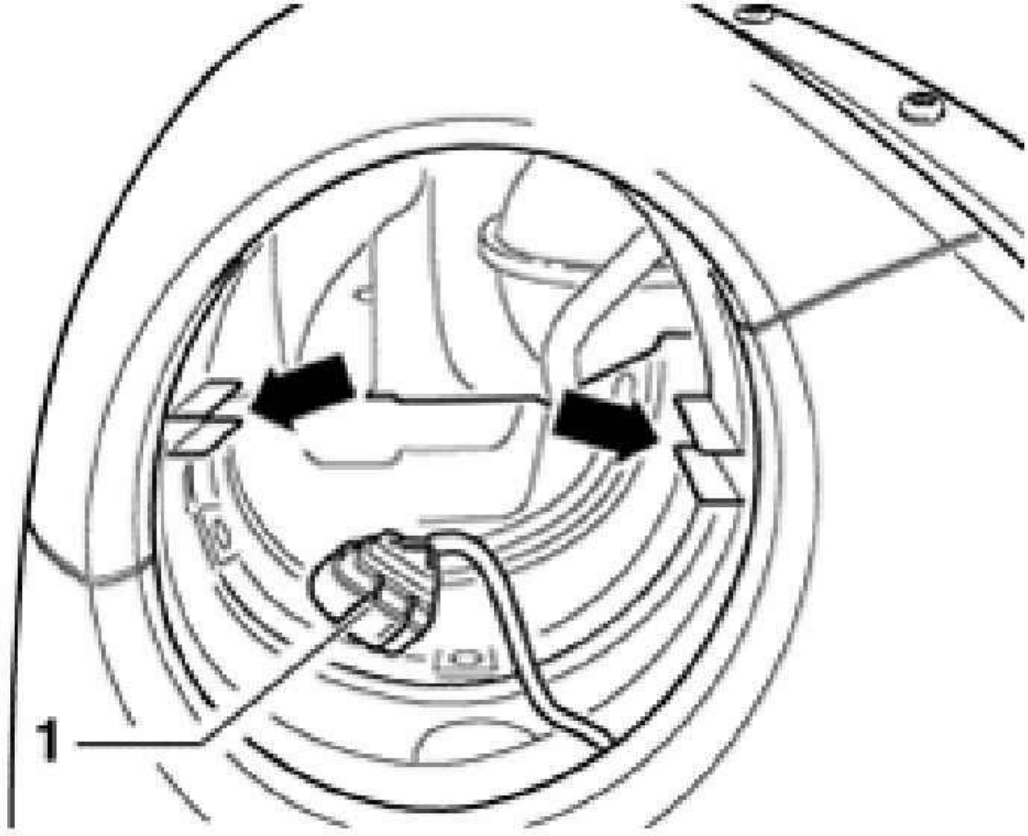


Fig. 26: Removing Universal Joint Bolt
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp hose from reservoir with hose clamp 3094.

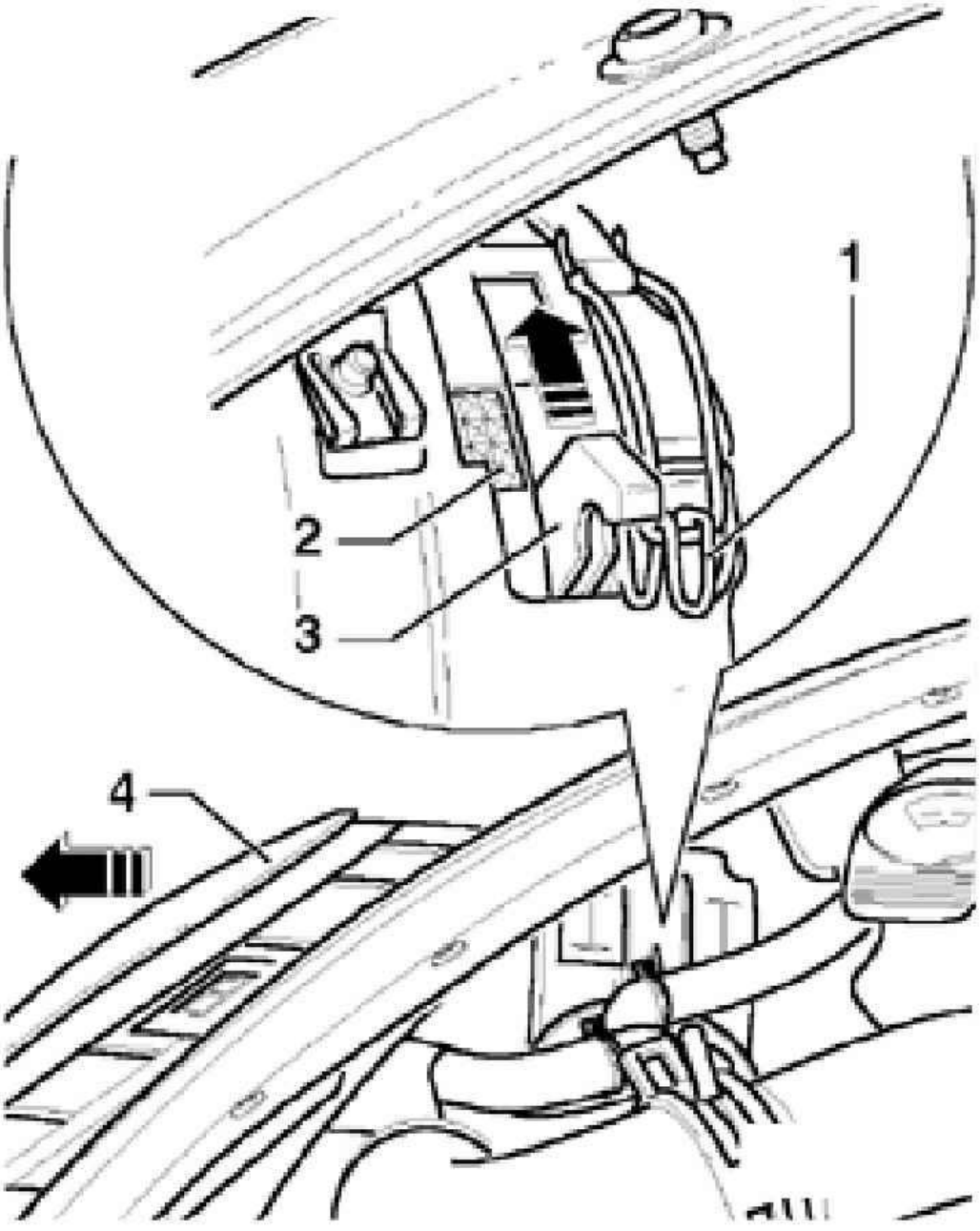


Fig. 27: Clamping Hose On Power Steering Pump With Hose Clamp 3094
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp hose on power steering pump with hose clamp 3094.

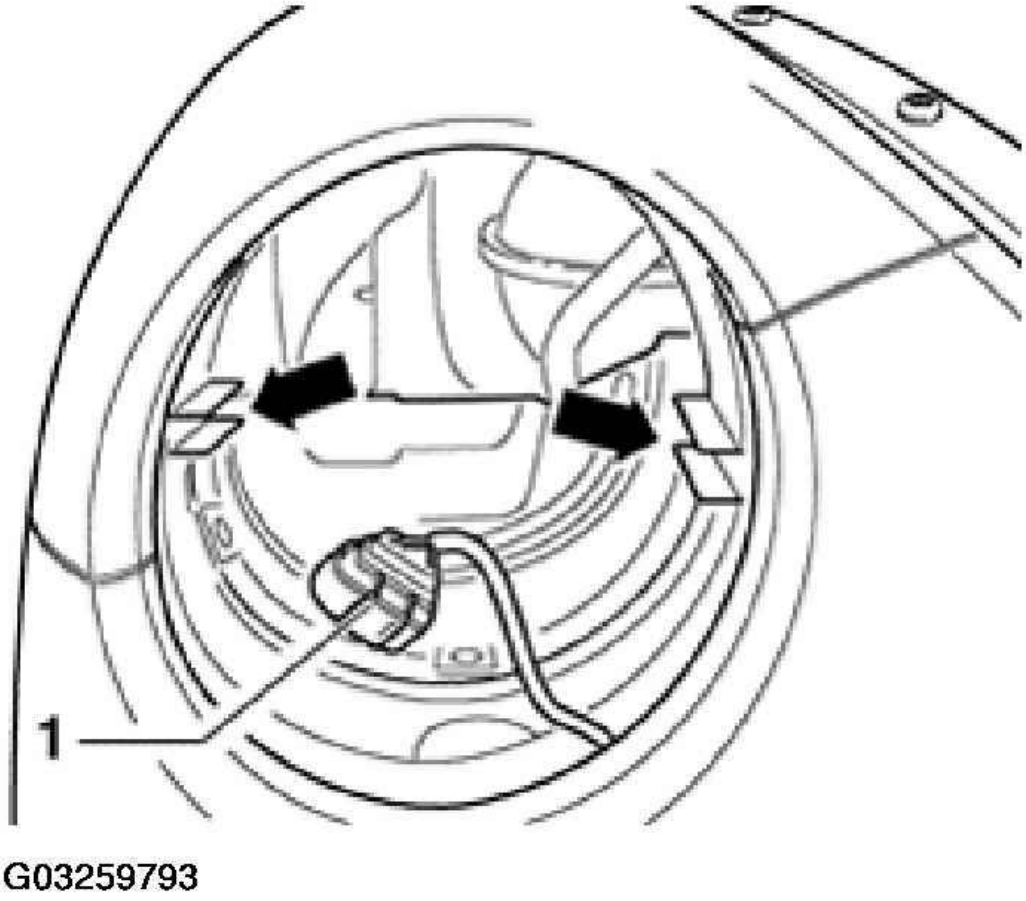


Fig. 28: Clamping Hose On Power Steering Pump With Hose Clamp 3094
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove insulation tray.
- Place drip tray underneath.
- Remove front wheels.
- Remove outer tie rod hex nut. See **TIE ROD, REMOVING AND INSTALLING** , item 17
- Press outer tie rod end off steering arm.

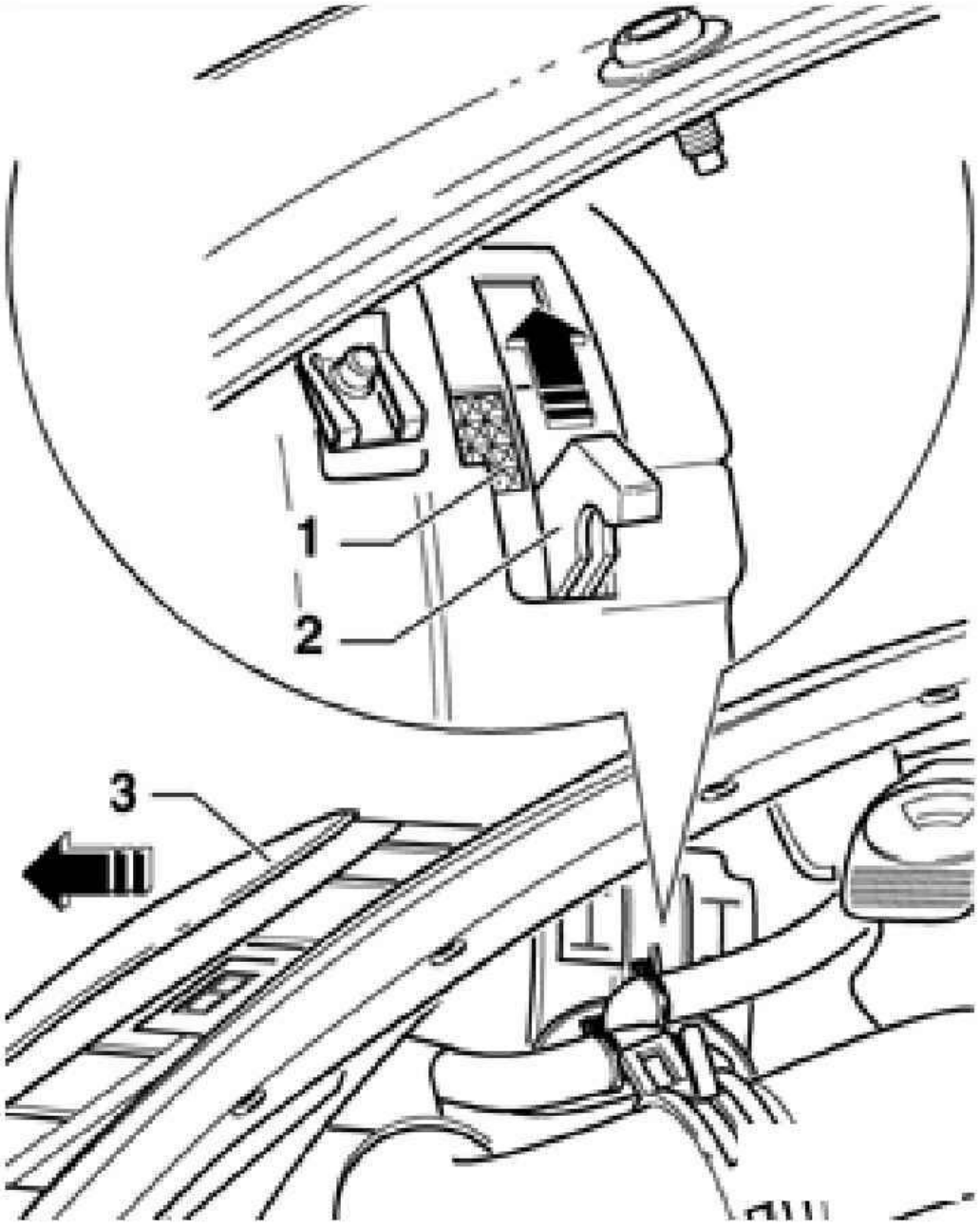


Fig. 29: Removing Outer Tie Rod End From Steering Arm
Courtesy of VOLKSWAGEN OF AMERICA, INC.

A. Ball joint puller (commercial type) e.g. Kukko 128/2

- Disconnect hoses from steering gear and seal with plastic bag and adhesive tape.
- Seal power steering gear threaded holes with plastic sealing plugs -1- and -2-.

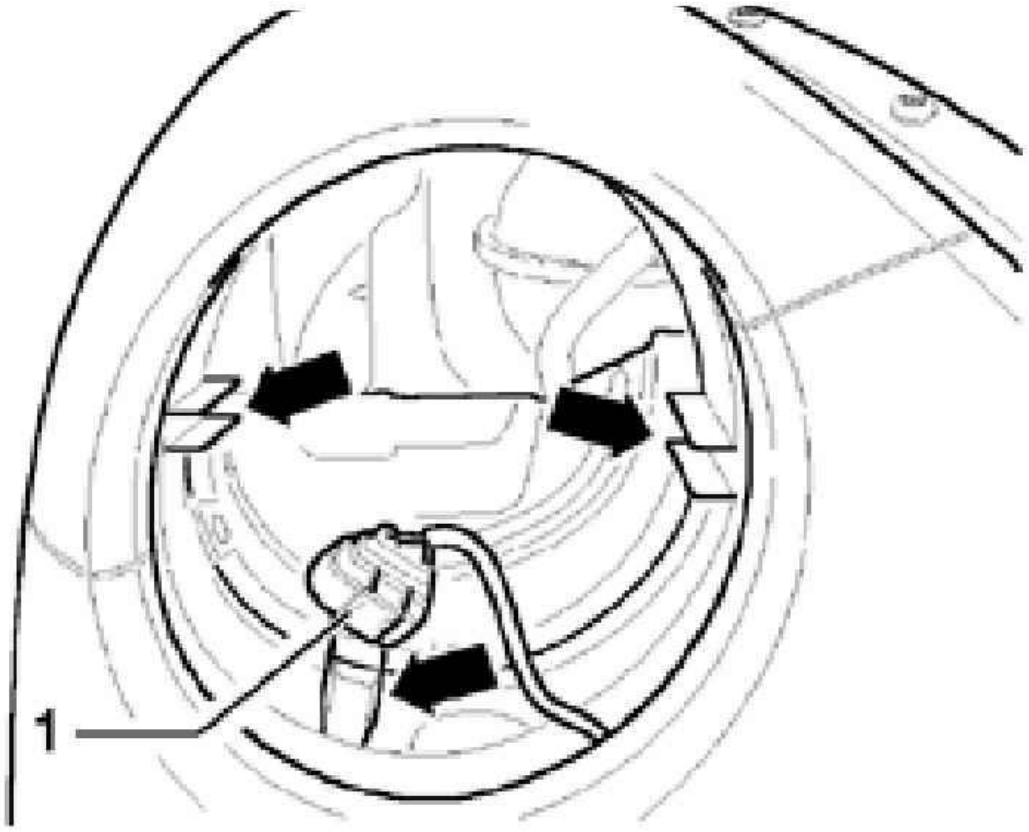


Fig. 30: Identifying Plastic Sealing Plugs
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove hex bolts -1- and -2-.

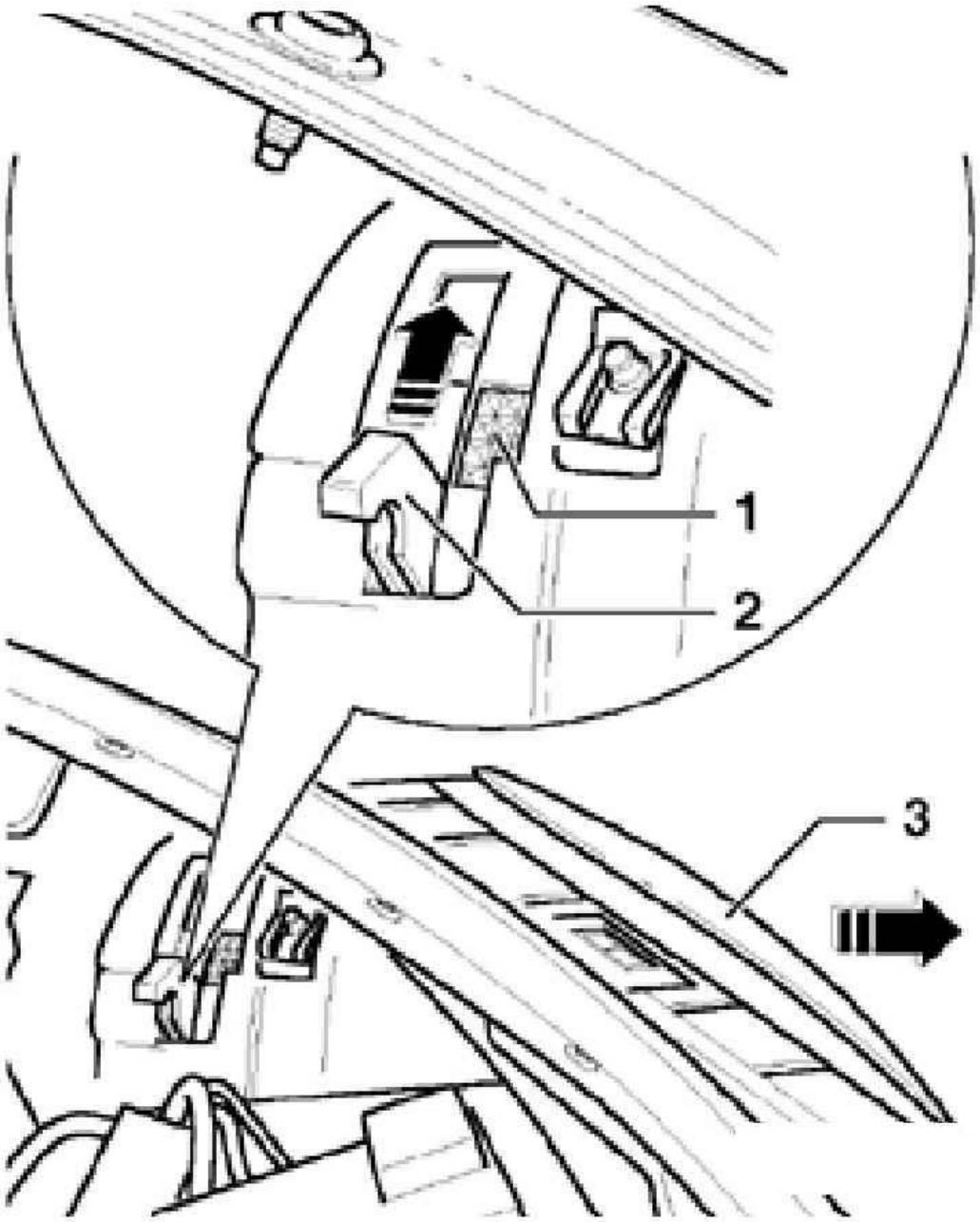


Fig. 31: Removing Hex Bolts From Pendulum Support
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with TDI engine

- Unbolt front exhaust pipe bracket on subframe -arrows- and unhook.

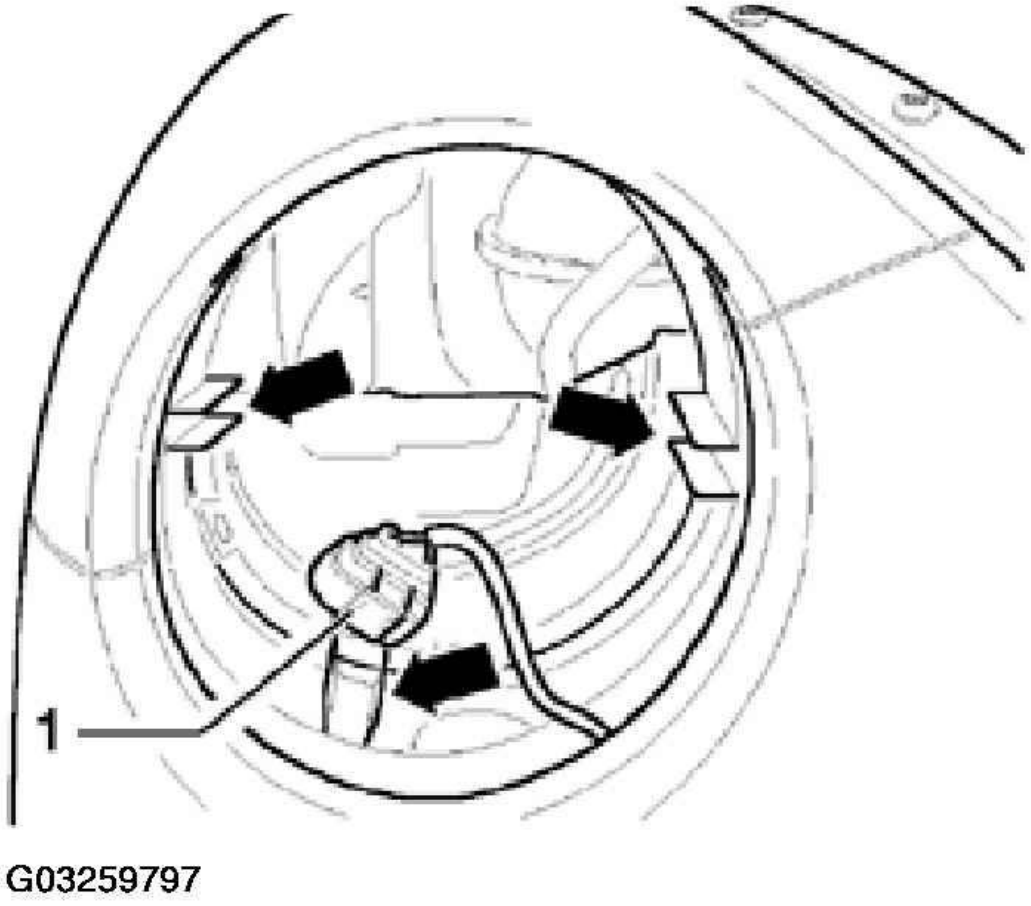


Fig. 32: Removing Front Exhaust Pipe Bracket Bolts (Vehicles With 1.9L TDI Engine)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Continued for all vehicles

- Support subframe using engine/transmission jack V.A.G 1383 A.
- Remove hex bolts -1-.
- Remove hex bolts -2- and -3-.
- Lower subframe using engine/transmission jack V.A.G 1383 A.
- Remove power steering gear bolts -1-.

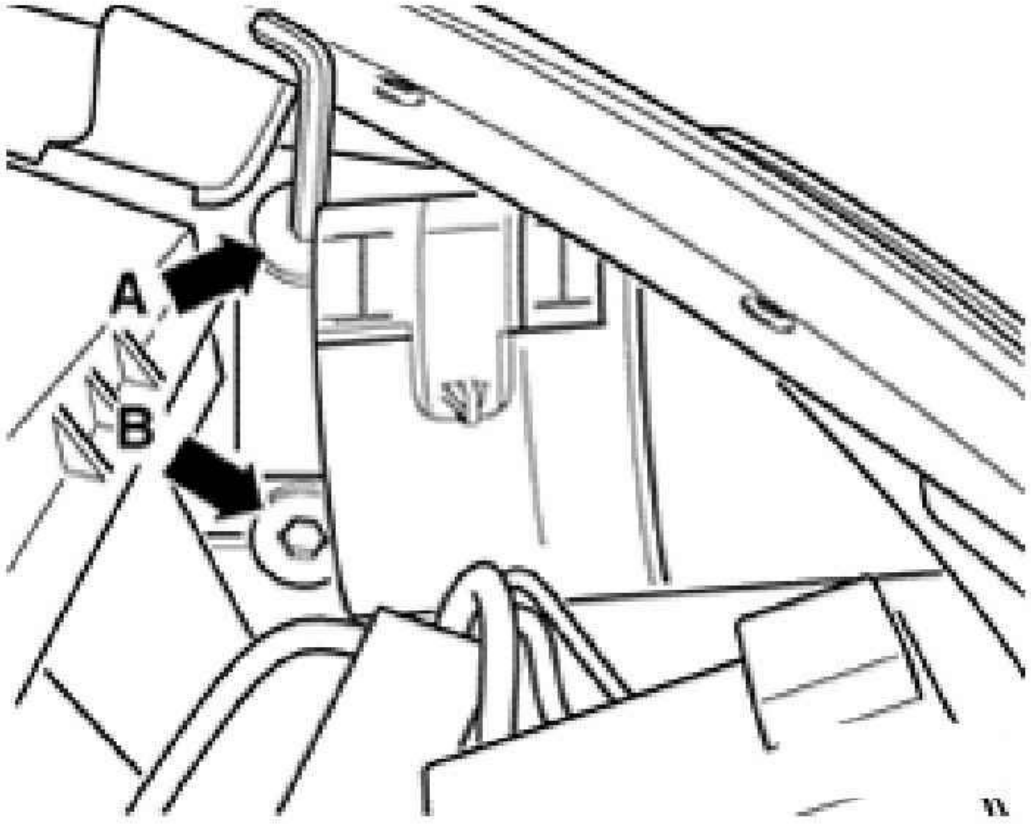


Fig. 33: Installing Engine/Transmission Jack
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Take power steering gear out to right side.

Installing

NOTE:

- **Use new sealing rings for hose/line connections.**
- **Coat steering gear seals with lubricant, e.g. soft soap, before installing steering gear.**
- **After installing the steering gear to the universal joint shaft make sure that the seal lies against the cover without kinking and that the opening to the footwell is correctly sealed. Otherwise noises may be created and/or allow water to pass through.**
- **Make sure sealing surfaces are clean.**

- Determine center position on steering rack. See **PLAY, SECURITY AND BOOTS ON TIE ROD ENDS, CHECKING**
- Install power steering gear onto subframe.

Threaded sleeve -1- must seat in hole on subframe.

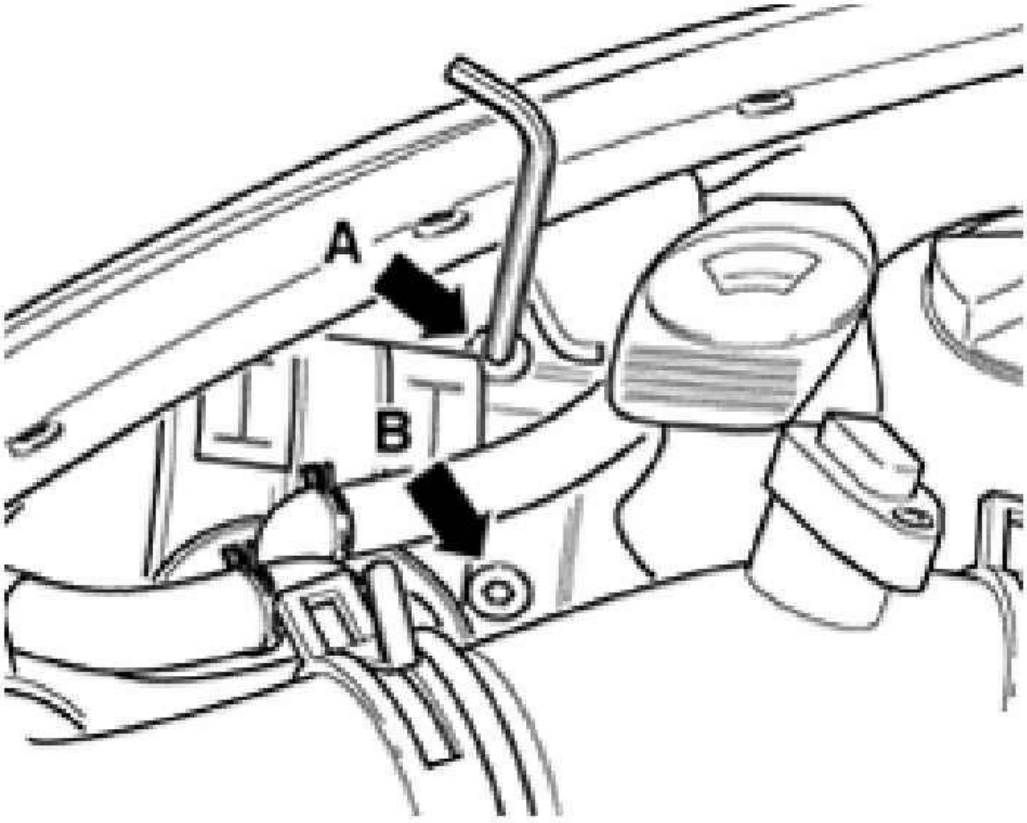


Fig. 34: Identifying Power Steering Gear Threaded Sleeve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Install in reverse order.

TIGHTENING TORQUE (POWER STEERING GEAR)

Fastener/location	Torque settings
Power steering gear to subframe(1)	20 N.m (15 ft lb) plus an additional 1/4 turn 90°
Subframe to body(1)	100 N.m (74 ft lb) plus an additional 1/4 turn 90°

Universal joint to steering gear(1)	30 N.m (22 ft lb)
Banjo bolt to steering gear M14 x 1.5	38 N.m (28 ft lb)
Banjo bolt to steering gear M16 x 1.5	45 N.m (33 ft lb)
Pendulum support to transmission	
M10 x 70	50 N.m (37 ft lb)
M10 x 30	50 N.m (37 ft lb)
Tie rod to steering arm(1)	45 N.m (33 ft lb)
(1) ALWAYS use new bolts and/or nuts.	

POWER STEERING GEAR, ASSEMBLY OVERVIEW

The power steering gear is not serviceable. If problems in the unit are suspected, determine the cause using pressure and leak tests. If a malfunction exists replace power steering gear.

NOTE:

- **Replace self-locking nuts and bolts. Welding and straightening work on steering components is not allowed.**
- **Do not re-use any fasteners that are worn or deformed in normal use.**
- **Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual. Replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.**
- **Do not attempt to weld or straighten the steering components or load bearing components of the suspension.**
- **To grease the rack only use steering gear grease Part No. AOF 063 000 04.**
- **Type of oil: Hydraulic oil Part No. G 002 000**
- **Oil system capacity: 0.7 ... 0.9 ltr (11.8 15.2 oz.).**

- Part numbers are listed here for reference only. Always check with your parts department for the latest information.

NOTE: The following list refers to items in Fig. 35 .

1. **Splash plate**
   - Checking: See **PLAY, SECURITY AND BOOTS ON TIE ROD ENDS, CHECKING**

     Modification:

     Modified tie rod ball joints. See **TIE ROD BALL JOINTS, MODIFIED**

   - Application see Parts catalog

2. **Hex nut**
   - 50 N.m (37 ft lb)
3. **Clamp**
   - Always replace
   - Tightening. See **INSTALLING**
4. **Boot**
   - Must not be twisted after adjusting tie
   - Remove steering gear to replace
5. **Clamp**
   - Always replace
   - Tightening. See **INSTALLING**
6. **Inner tie rod**
   - 75 N.m (55 ft lb)

     Modification:

     Modified tie rods. See **TIE RODS, MODIFIED**

   - Removing and installing. See **TIE ROD, REMOVING AND INSTALLING**
   - Replacement parts are supplied preset
   - Vehicle alignment. See **WHEEL ALIGNMENT PROCEDURES** .
   - Different versions
   - Application see Parts catalog
7. **Hex bolt**
   - 22 N.m (16 ft lb)
8. **Gasket**
   - Observe installing instructions! See **INSTALLING** .
9. **Hydraulic hose**
10. **Banjo bolt**
    - 45 N.m (33 ft lb)

      M 16 x 1.5

11. **Banjo bolt**
    - 38 N.m (28 ft lb)

      M 14x 1.5

12. **Sealing rings**
    - Always replace

13. **Return line**
14. **Steering gear**
    - Removing and installing. See **POWER STEERING, SERVICING**
15. **Mounting bracket with rubber mounting**
    - Replace if threads in welded nut are damaged
16. **Heat shield**
17. **Self-locking hex nut**
    - 45 N.m (33 ft lb)
18. **Hex nut**
    - 22 N.m (16 ft lb)

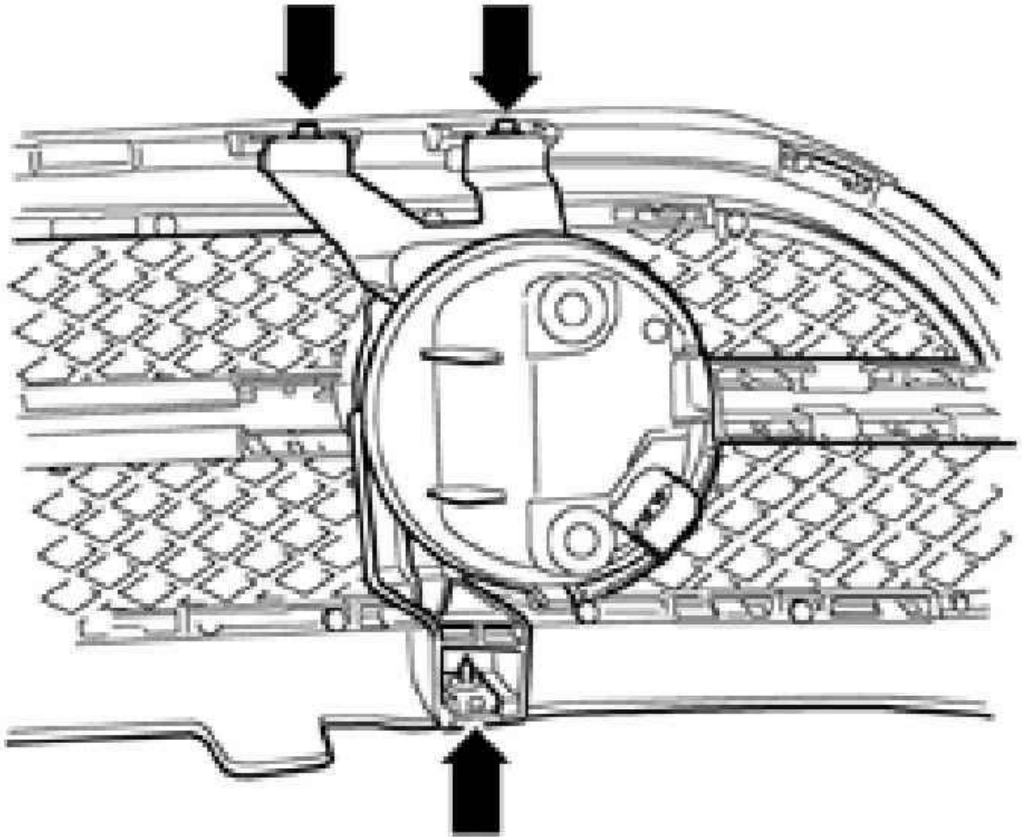


Fig. 35: Exploded View Of Power Steering Gear Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

TIE ROD, REMOVING AND INSTALLING

Special tools and equipment

- VW 313 Support clamp
- V.A.G 1275 Pliers
- V.A.G 1332 Torque wrench
- V.A.G 1332/5 Open jaw insert, 34 mm AF
- T10108 Transmission bracket

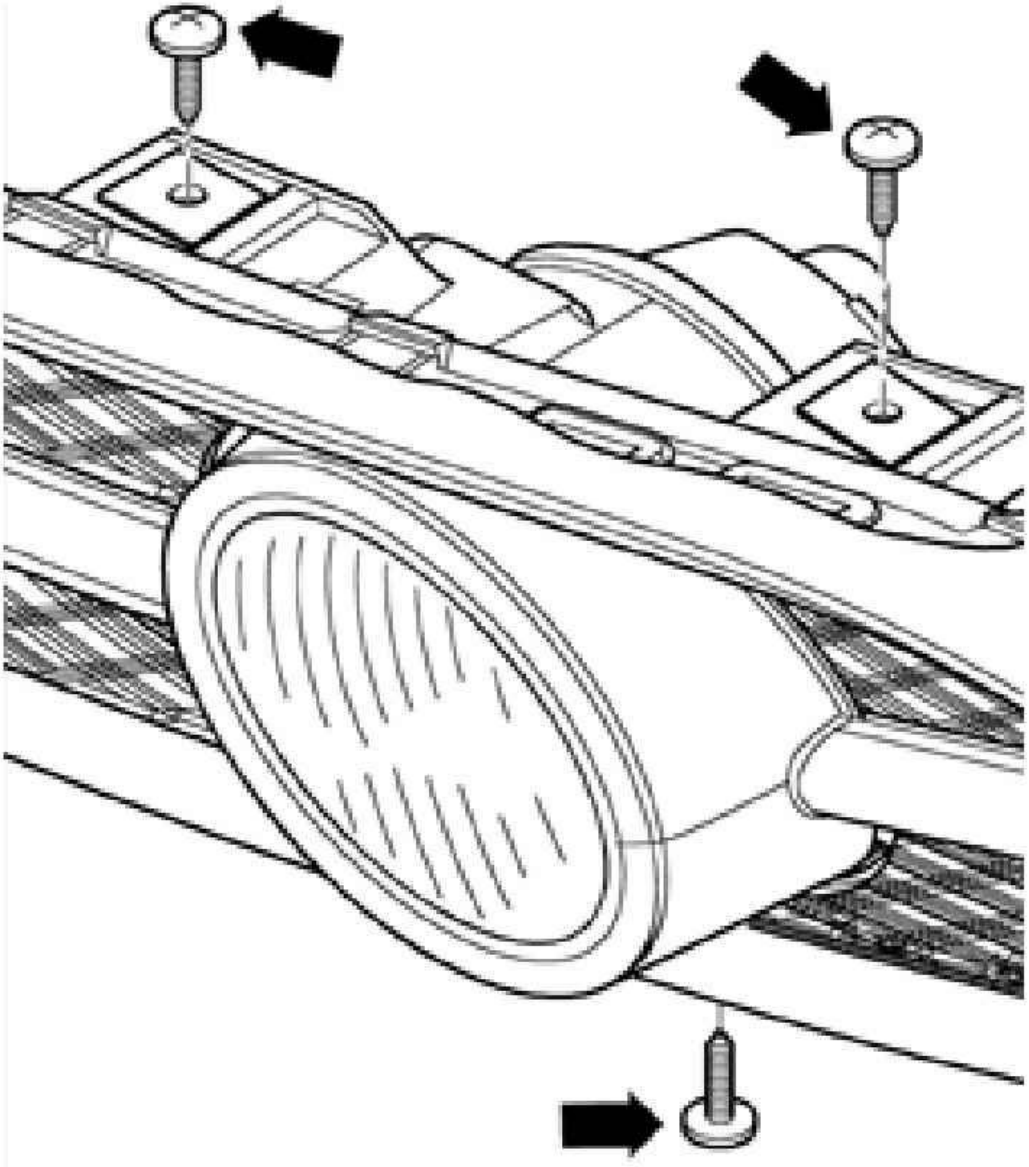


Fig. 36: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

The tie rods can only be removed/installed with the steering gear removed.

Removing and installing power steering gear. See **POWER STEERING, SERVICING**

- Seal line/hose connections on power steering gear if not already done.
- Clean outside of power steering gear in surrounding area of the boot.
- Open hose clamps and push boot back.
- Clamp steering gear on transmission holder T10108 and unscrew tie rod from coupling rod.
- To determine center position on the rack. See **CENTER POSITION ON STEERING RACK, DETERMINING**

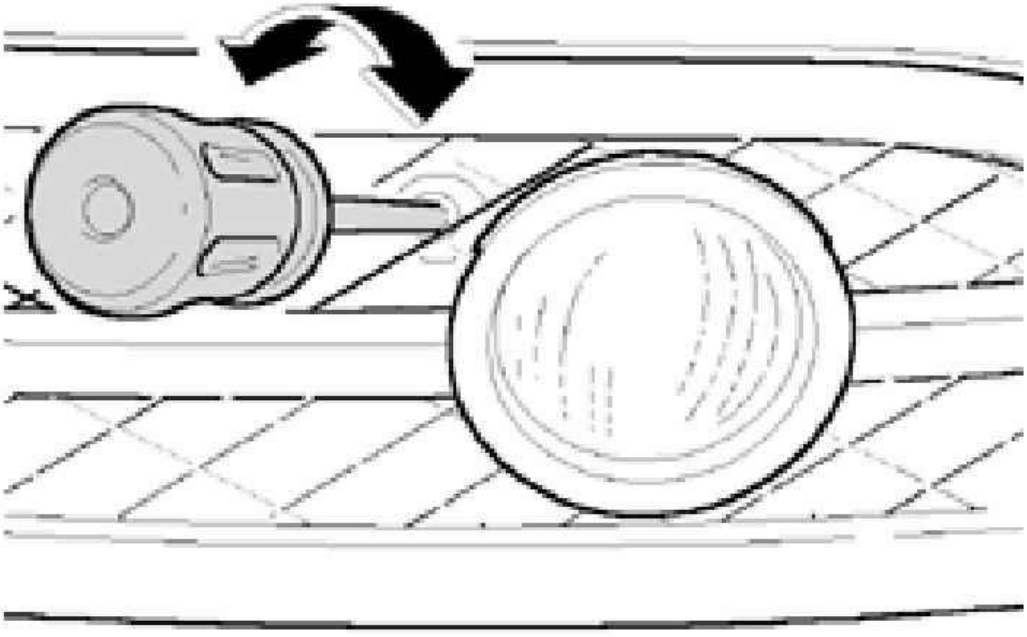


Fig. 37: Removing Tie Rod From Coupling Rod
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: To clamp steering gear, use hole "5" and the corresponding hole lying opposite in transmission holder T10108.

Installing

Install in reverse order.

Tightening torque:

Tie rod to power steering gear 75 N.m (55 ft lb)

Installing boot

- Check boot for wear (cuts, cracks) and make sure sealing surfaces are clean.
- Install boot, but first turn the tie rod so that the tie rod ball joint tapered pin is in the installation position.

NOTE:

- **Only use genuine clamp-type clips.**

- Tighten clip with pliers V.A.G 1275.

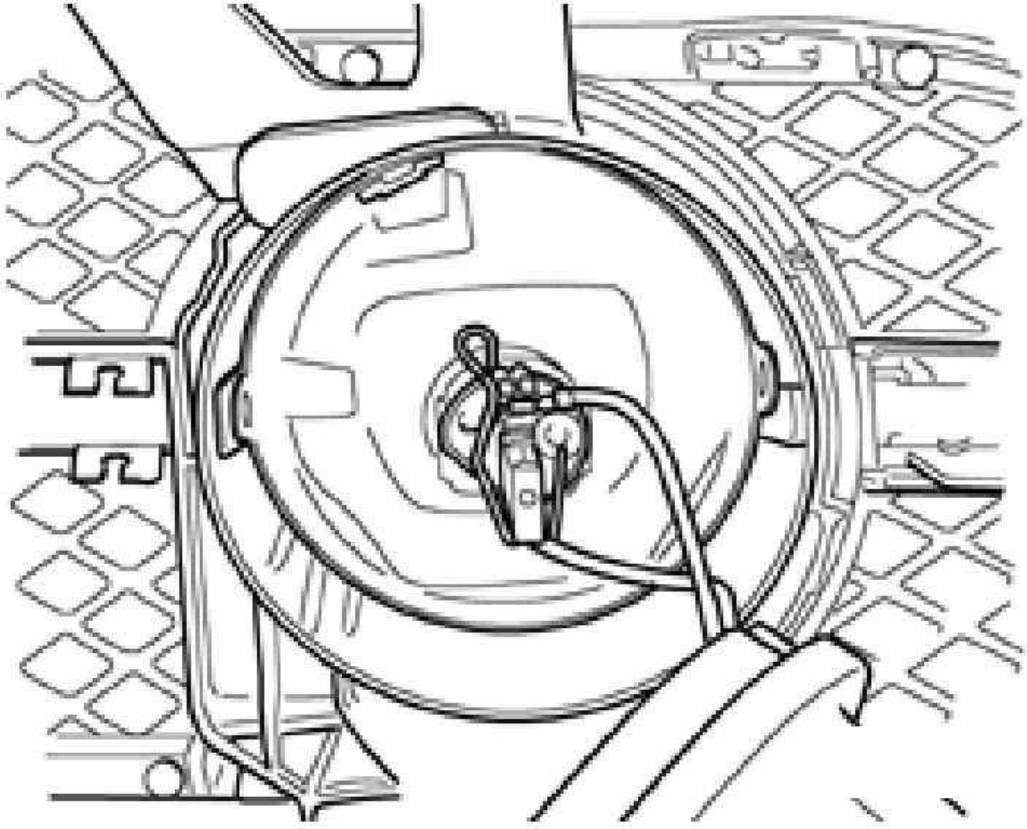


Fig. 38: Tighten Boot Clamp Clip With Pliers V.A.G 1275
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install power steering gear.

Removing and installing power steering gear. See **POWER STEERING, SERVICING**

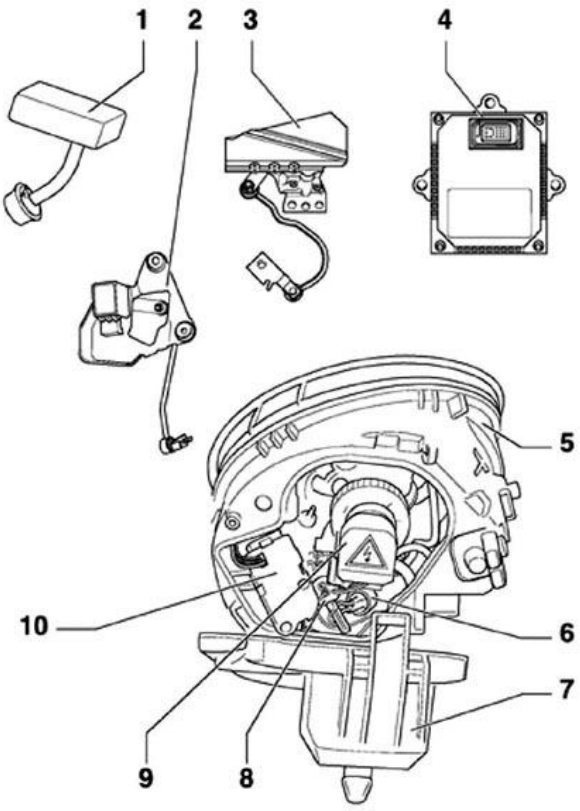
TIE ROD BALL JOINTS, MODIFIED

The manufacturing process for the tie rod ball joints has been optimized. This has resulted in changes to the external shape and length of the internally threaded shaft.

It was then necessary to modify the tie rods to match the tie rod ball joints. See **TIE RODS, MODIFIED**

Introduction will be gradual.

The modified tie rod ball joints can be recognized by the following features.



1 - Left/Right Control Module for High Intensity Gas Discharge (HID) Lamp -J343- / -J344-

2 - Left Front Level Control System Sensor -G78-

3 - Left Rear Level Control System Sensor -G76-

4 - Left/Right High Intensity Gas-discharge Lamp (with range control) Control Module - J567- / -J568-

5 - Headlight housing

6 - Parking light bulb

7 - Sealing cap

8 - High beam bulb

9 - High Intensity Gas Discharge (HID) lamp

10 - Headlight beam adjusting motor - V48- / -V49-

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Fig. 39: Identifying Right And Left Hand Tie Rod Ball Joint
Courtesy of VOLKSWAGEN OF AMERICA, INC.

A. **A - Right-hand tie rod ball joint**

1. Hex on internally threaded shaft, wrench size 19 mm (.75 in.)

   Dimension -a-; 94 +/- 0.5 mm (3.70 0.020 in.)

   Identification "A" for right

B. **B - Left-hand tie rod ball joint**

1. Hex on internally threaded shaft, wrench size 19 mm (.75 in.)

   Dimension -a-; 94 +/- 0.5 mm (3.70 0.020 in.)

   Identification "B" for left

Identifying features for the previous tie rod ball joint

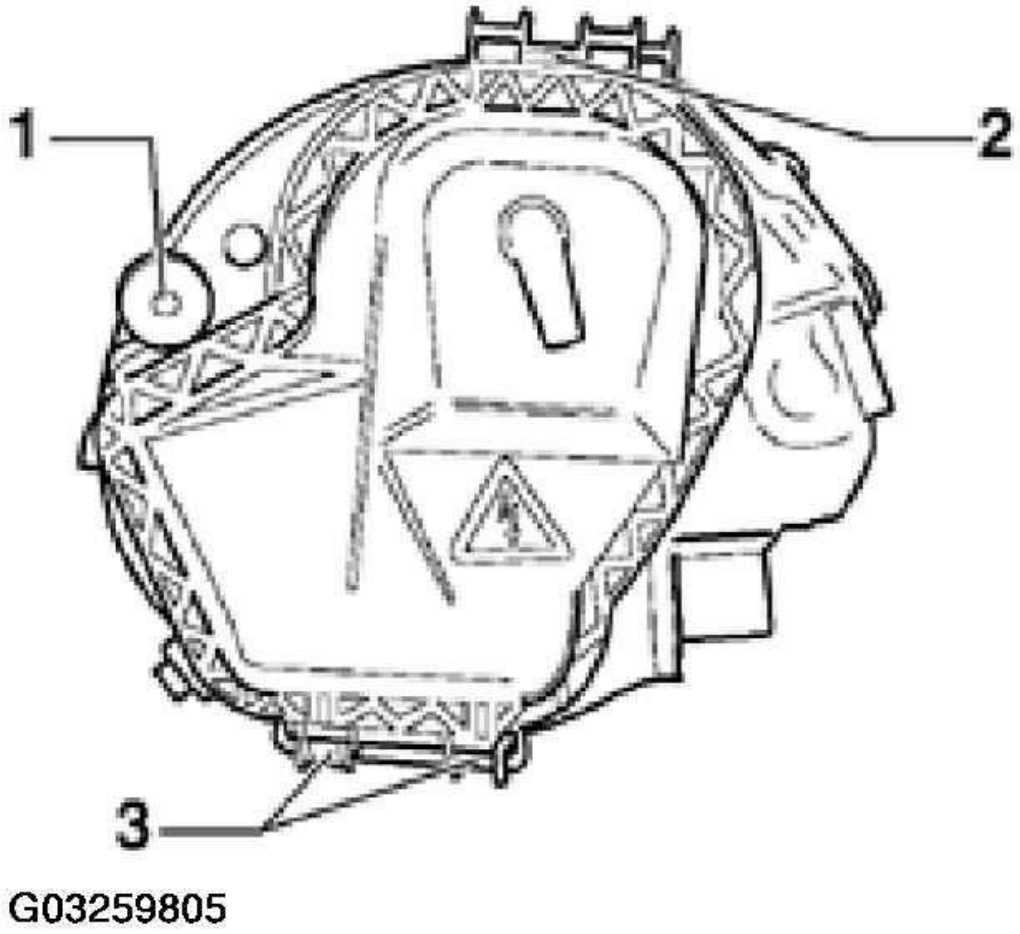

Fig. 40: Identifying Features For The Previous Tie Rod Ball Joint (Flats For Wrench On Shaft)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

1. Flats for wrench on the shaft, marked with "R" or "L"

   wrench size 22 mm (.87 in.)

   Dimension -a-; 74-1 mm (2.92 0.04 in.)

   The shaft -arrow- is round

WARNING: This tie rod ball joint must not be installed to a tie rod which has a length of -a- 318.9 mm (12.56 in.)!

TIE RODS, MODIFIED

The tie rods have been shortened.

NOTE: A mixed installation of previous and new tie rods is not allowed!

Tie rod dimensions

- Previous tie rod; dimension -a- 343.1 mm (13.51 in.)
- New tie rod; dimension -a- 318.9 mm (12.56 in.)

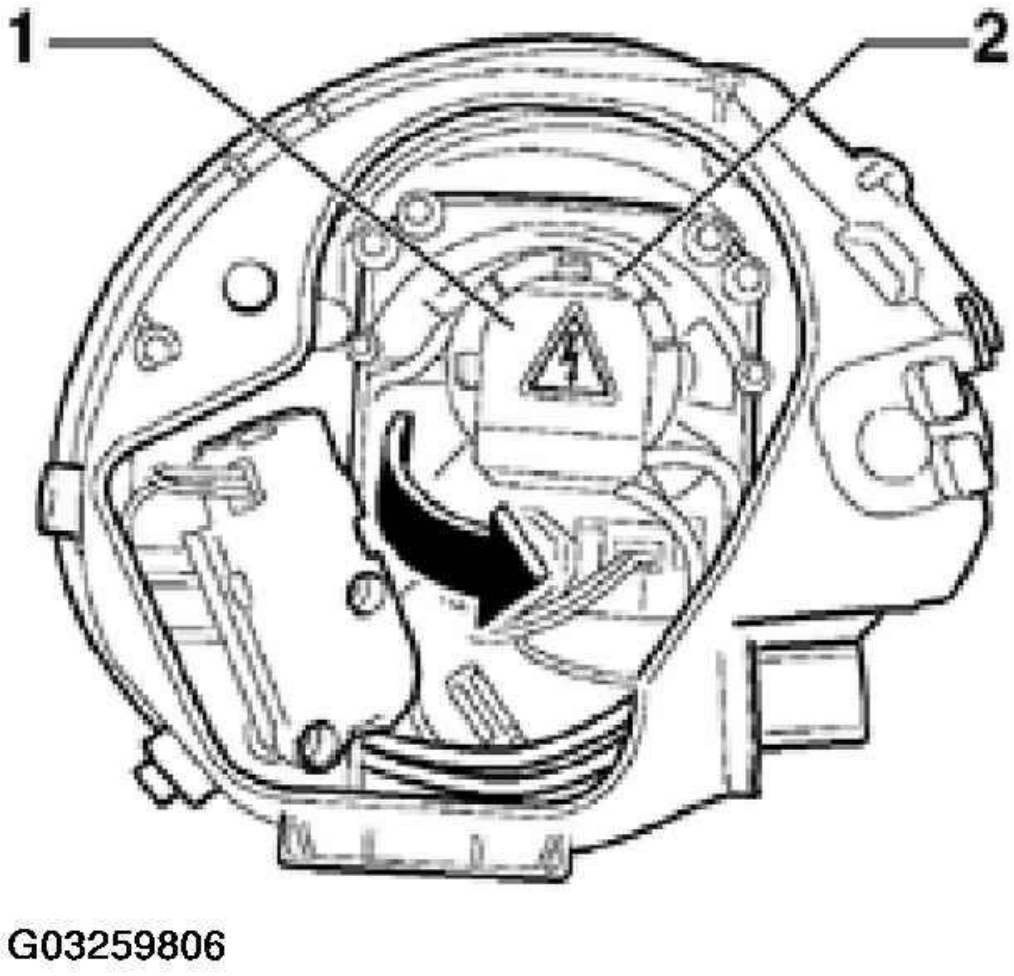

Fig. 41: Identifying Tie Rod Dimension Measuring Points
Courtesy of VOLKSWAGEN OF AMERICA, INC.

PLAY, SECURITY AND BOOTS ON TIE ROD ENDS, CHECKING

- With vehicle raised (wheels hanging free), check play by moving tie rods and wheels.
- Play: Zero play
- Checking mountings.
- Check boots are not damaged and are seated correctly.

CENTER POSITION ON STEERING RACK, DETERMINING

Steering rack should be positioned in the center before installing power steering gear.

- Slide rack until dimension -a- is achieved.

  Dimension -a- = 30.5 mm (1.20 in.)

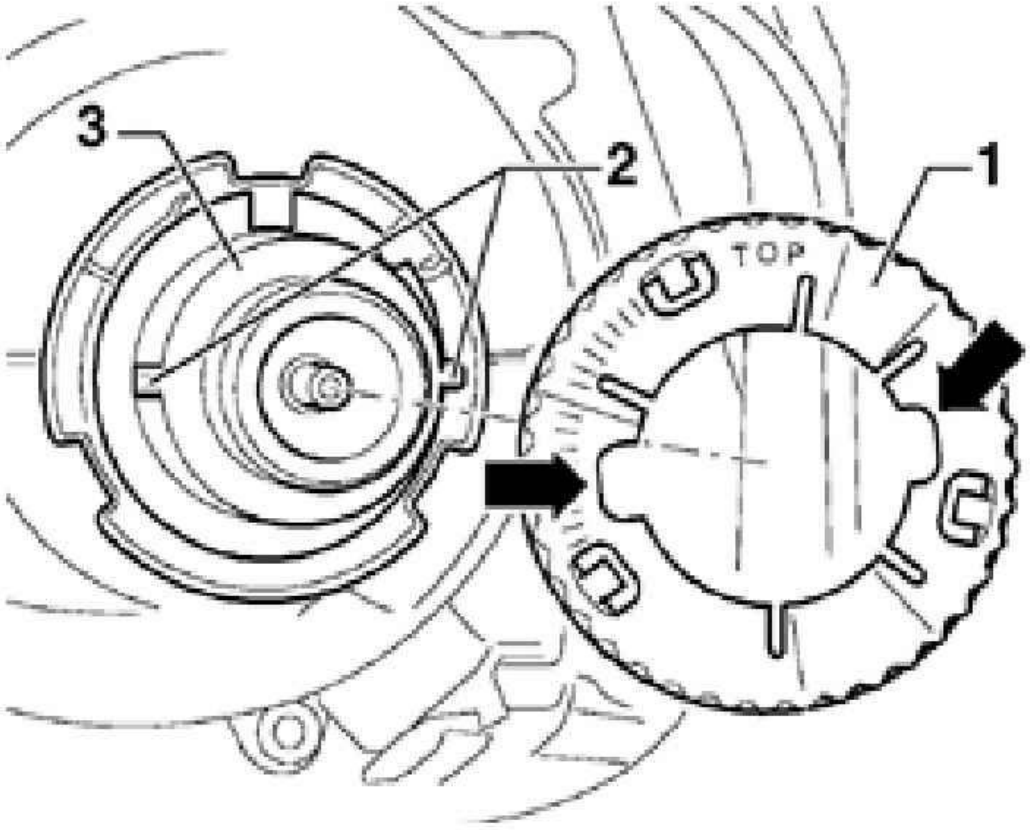

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Fig. 42: Identifying Slide Rack Dimension
Courtesy of VOLKSWAGEN OF AMERICA, INC.

STEERING GEAR, ADJUSTING

NOTE: Two technicians are required when adjusting.

Adjust with engine switched off.

- Raise vehicle on hoist.
- Wheels in straight-ahead position.
- First technician: turn steering wheel back and forth (approx. 30° from center axis).
- Knocking noise will be heard if there is excessive play
- The second technician carefully turns the adjustment screw into the cover until the knocking noise can no longer be heard inside the vehicle.

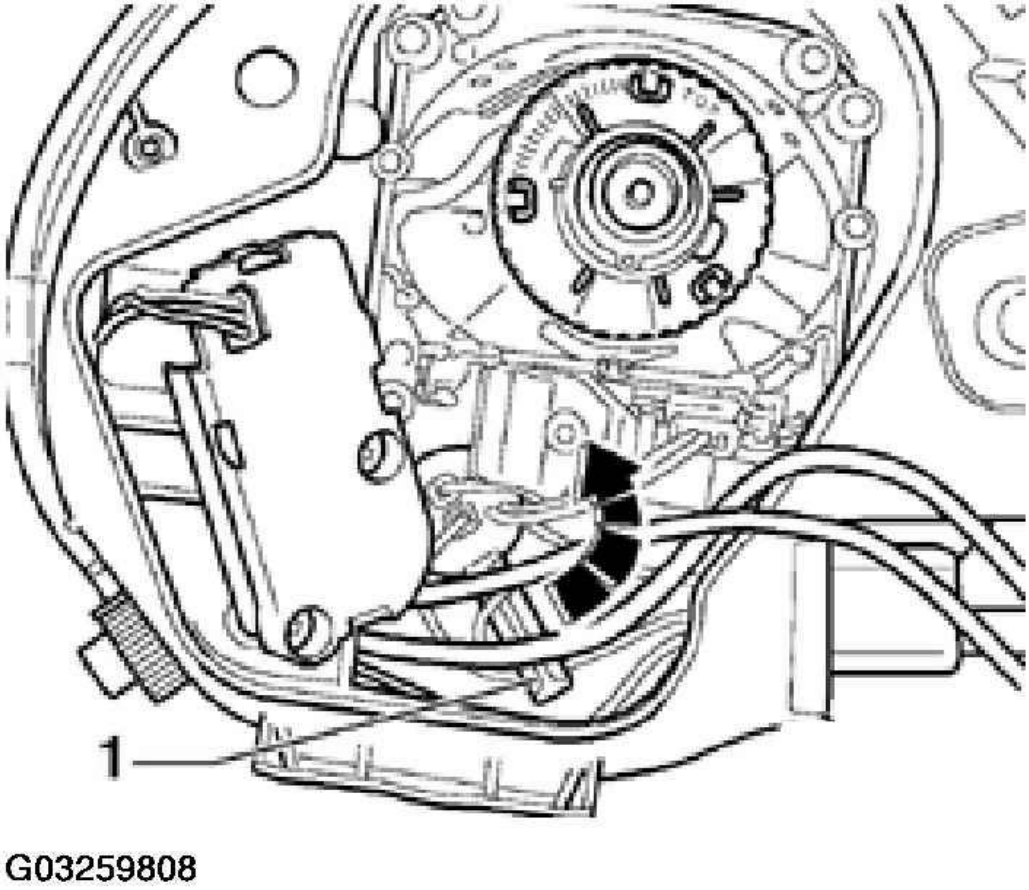

Fig. 43: Turning Steering Gear Adjustment Screw
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Complete a road test ensuring that when maneuvering or negotiating corners the steering self-centers without sticking.
- Secure lock nut with a punch mark -arrow-.

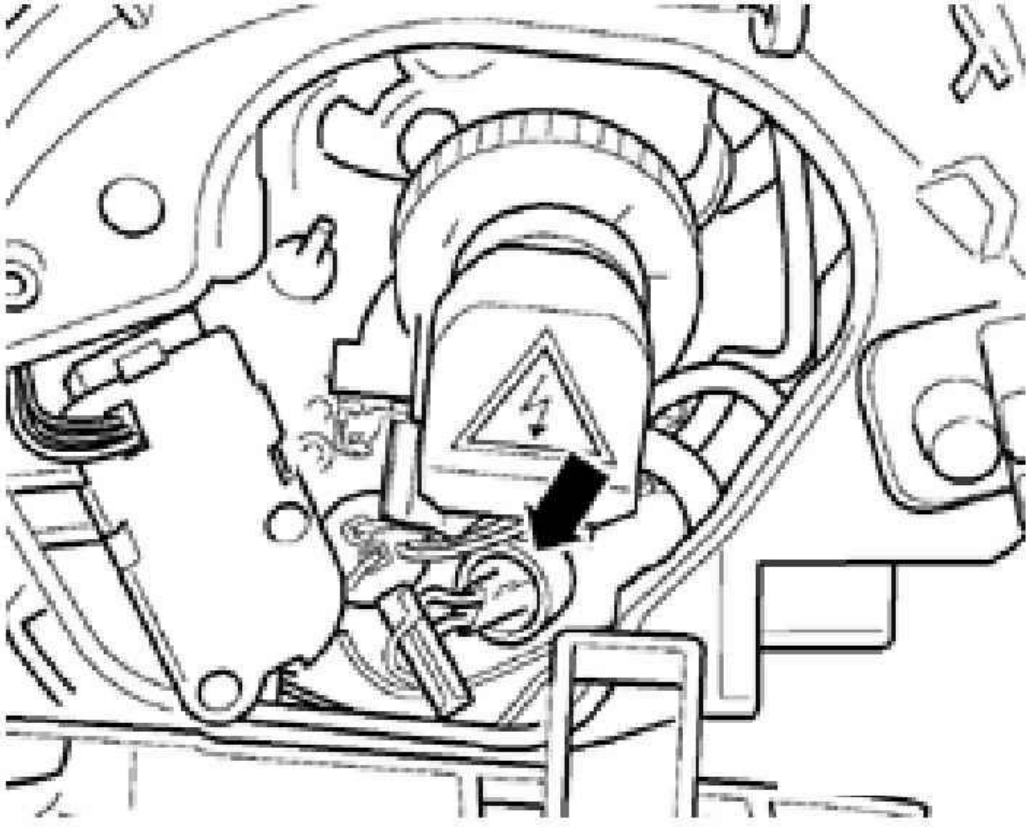

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Fig. 44: Securing Steering Gear Adjustment Screw Lock Nut With Punch Mark
Courtesy of VOLKSWAGEN OF AMERICA, INC.

POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES

POWER STEERING PUMP DELIVERY PRESSURE, VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, CHECKING

Special and equipment

- 3094 Hose clamps
- V.A.G 1402 Power steering test unit
- V.A.G 1402/1 A Adapter
- V.A.G 1402/2 Adapter
- V.A.G 1402/6 Hose from adapter set

- VAS 5024 Assembly pliers

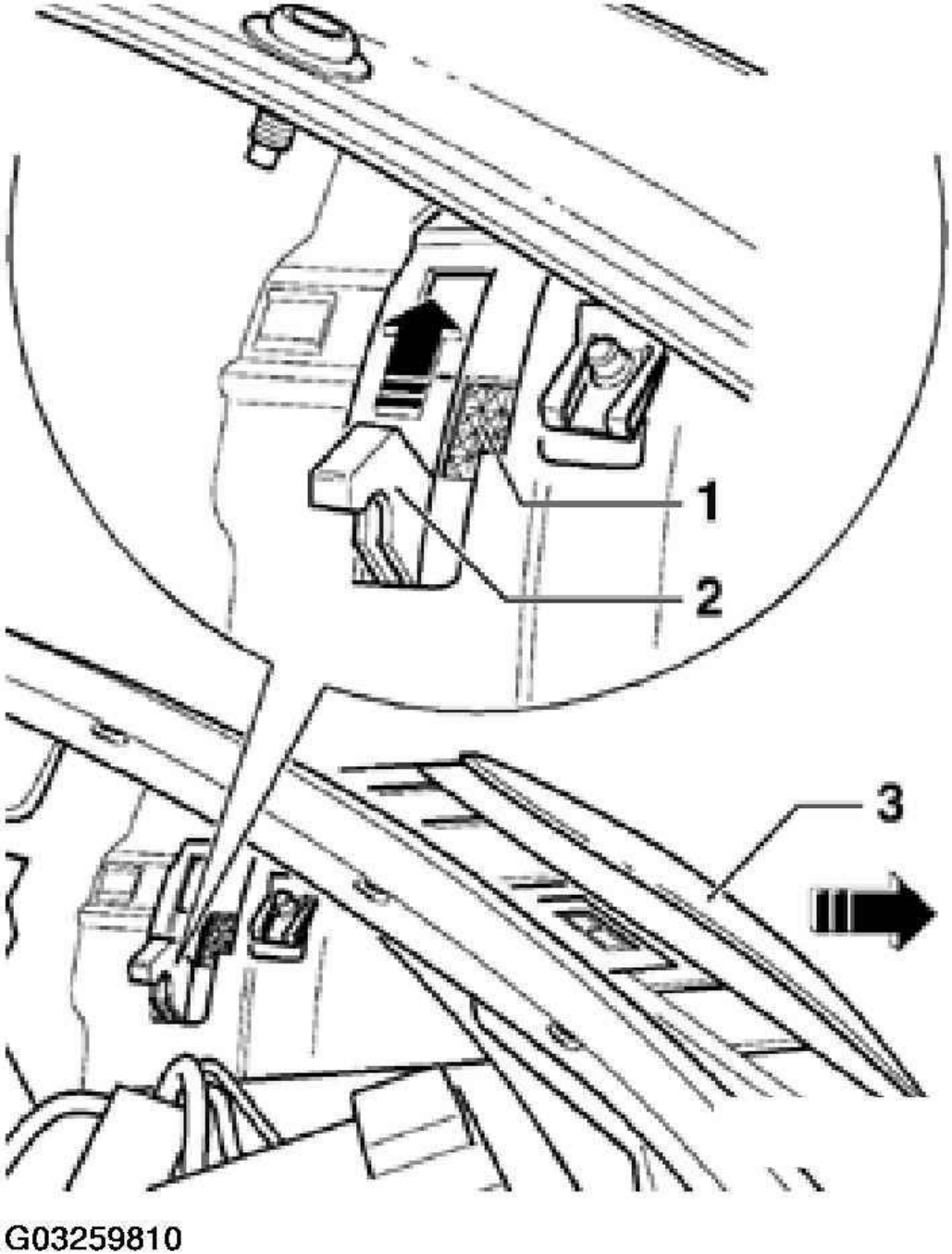

Fig. 45: Identifying Special Tool And Equipment

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp return hose with hose clamp 3094.

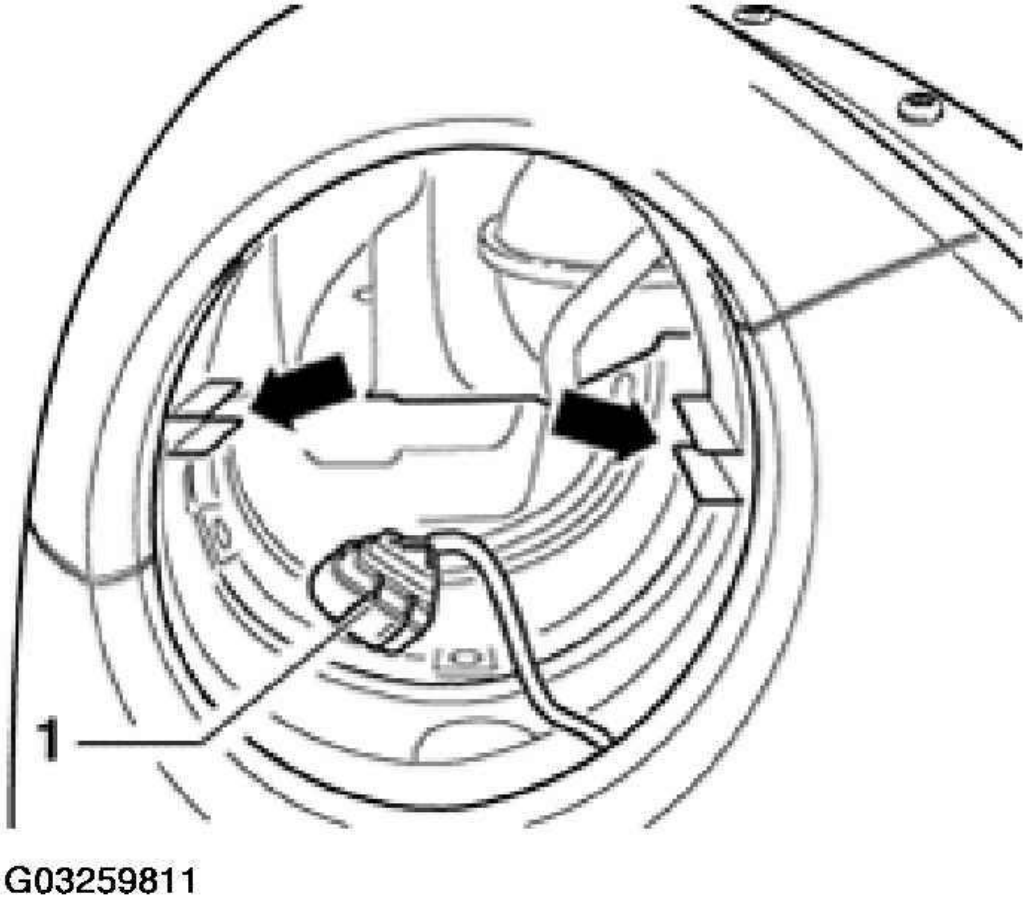

Fig. 46: Clamping Return Hose Clamp With Hose Clamp 3094
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove noise insulation panel.
- Clamp suction hose with hose clamp 3094.

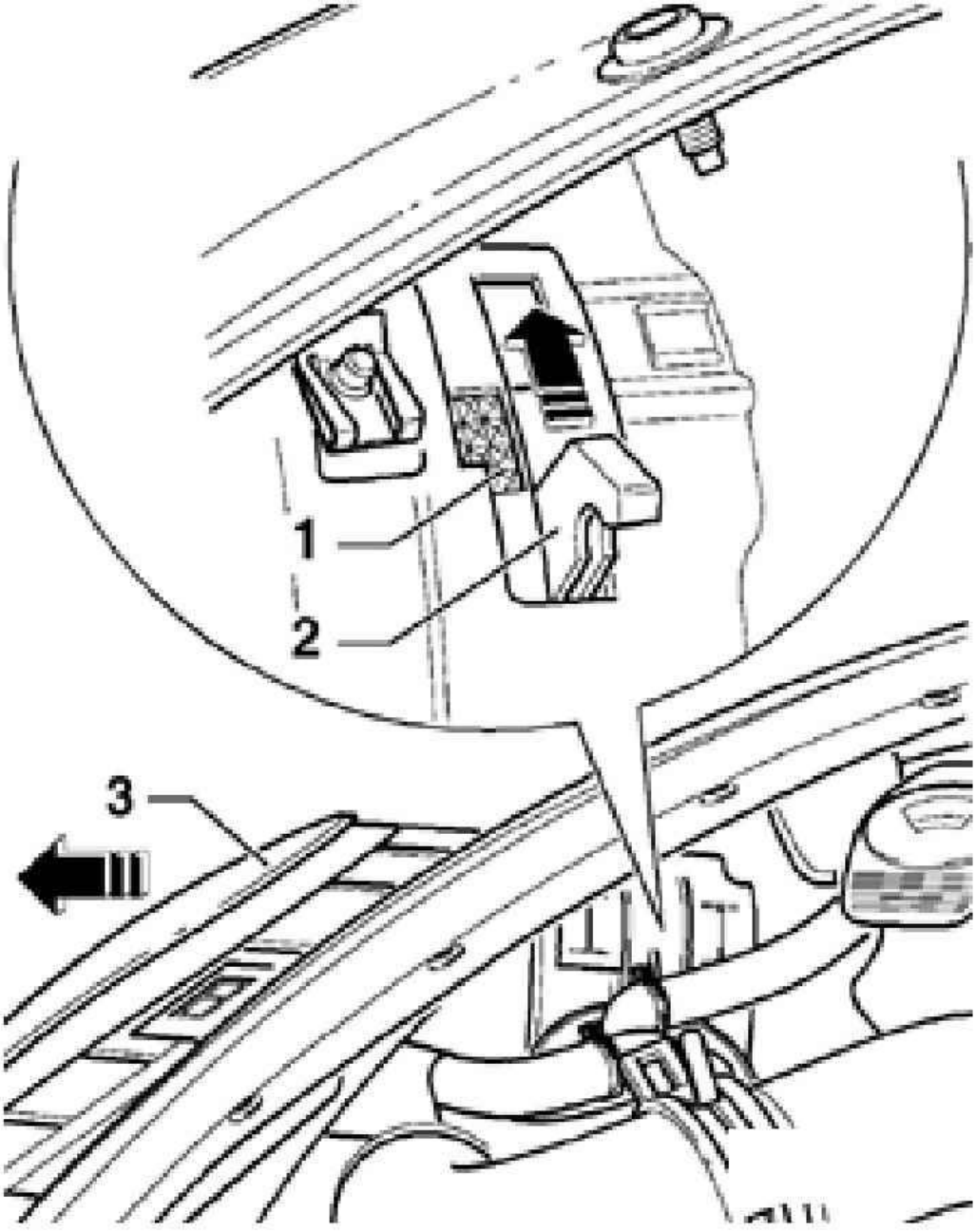

Fig. 47: Clamping Suction Hose With Hose Clamp 3094
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place drip tray underneath.
- Disconnect bracket for pump pressure line from cylinder block.
- Disconnect pump pressure line.
- Install adapter -1-.

  Use a sealing ring.

  1. V.A.G 1402/1 A
  2. V.A.G 1402/6 Hose from adapter set

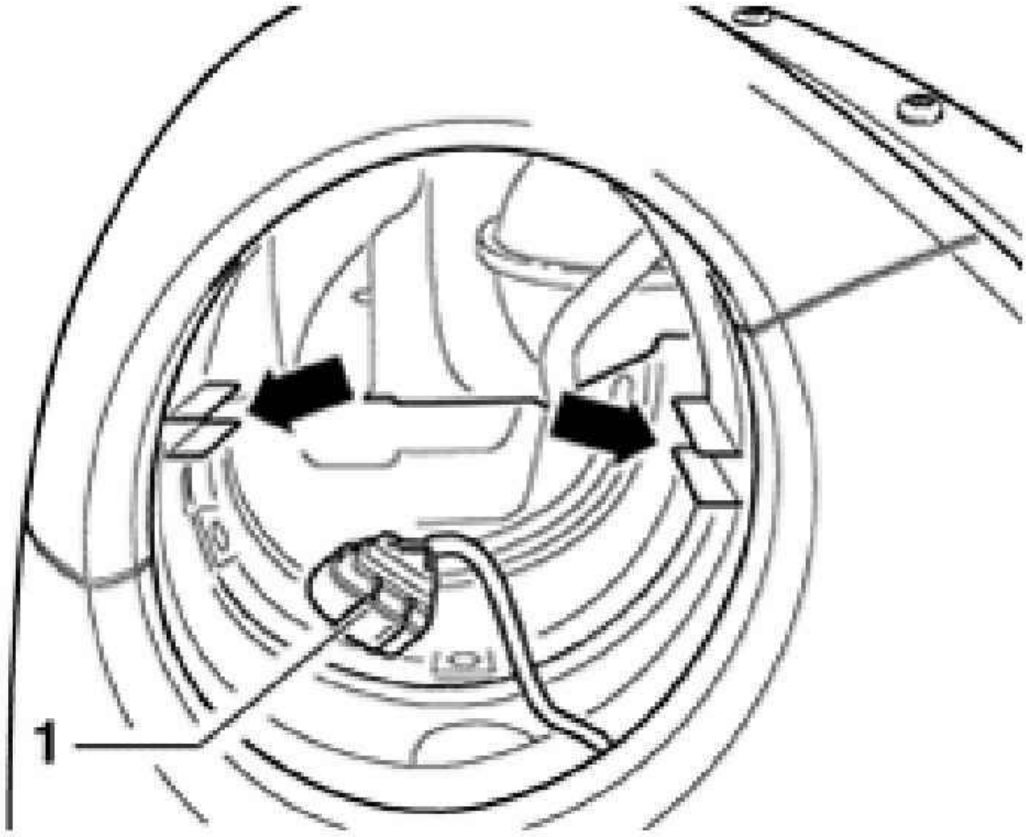

Fig. 48: Installing Adapter V.A.G 1402
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Connect pressure gauge V.A.G 1402.

1. V.A.G 1402 Pressure gauge
2. V.A.G 1402/6 Hose from adapter set
3. Banjo union bolt
4. Pressure hose banjo union
5. V.A.G 1402/2
6. V.A.G 1402 Hose from pressure gauge

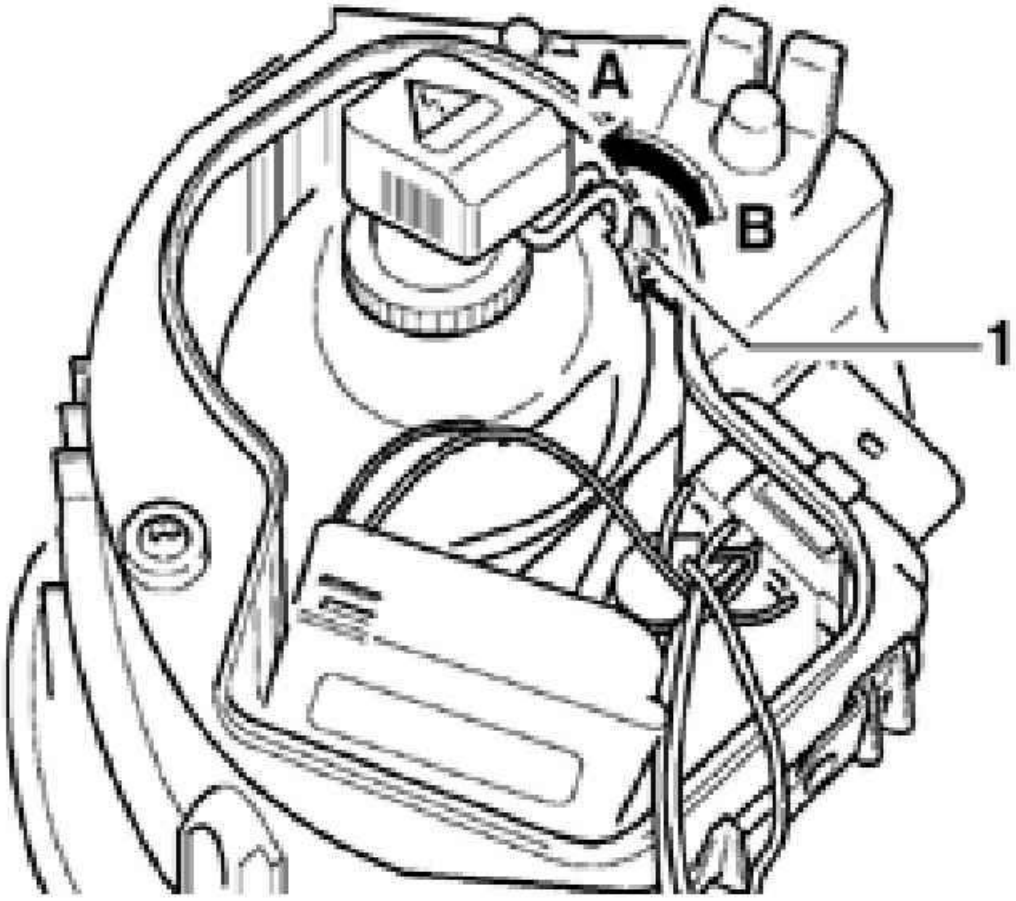

Fig. 49: Connecting Power Steering Pressure Gauge (Vehicles With Power Steering Pump In Lower Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove hose clamp 3094 from suction and return hoses.

- Start engine and if necessary add fluid to reservoir.
- Turn steering wheel approx. 10 times from lock to lock.
- Now check delivery pressure.

Requirements:

- Ribbed belt/ribbed belt tension OK.
- System not leaking.
- Hoses/lines are not kinked or restricted.
    - With engine running at idle speed. Close cut-off valve (not longer than 5 seconds) and read off pressure.

Specifications

Gasoline engines: 85...95 bar (1233 - 1378 psi)

Diesel engines: 96... 105 bar (1392 - 1523 psi)

NOTE:

- **If the reading is higher or lower than specified, replace power steering pump.**
- **Removing and installing power steering pump, vehicles with power steering pump in lower section. See POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING .**
- **If reservoir fluid level is low then check steering system for leaks.**
- **For leaks at the pinion first check the lines/line connections for leaks and if necessary tighten and wipe dry.**
- **If the pinion seal or the rack seals in steering gear housing are leaking then replace steering gear.**
- **To check the rack seals loosen the hose clip on the boot and push boot to one side.**

POWER STEERING PUMP DELIVERY PRESSURE, VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, CHECKING

Special tools and equipment

- 3094 Hose clamps
- V.A.G 1402 Power steering test unit
- V.A.G 1402/1 A Adapter
- V.A.G 1402/2 Adapter
- V.A.G 1402/6 Hose from adapter set

- VAS 5024 Assembly pliers

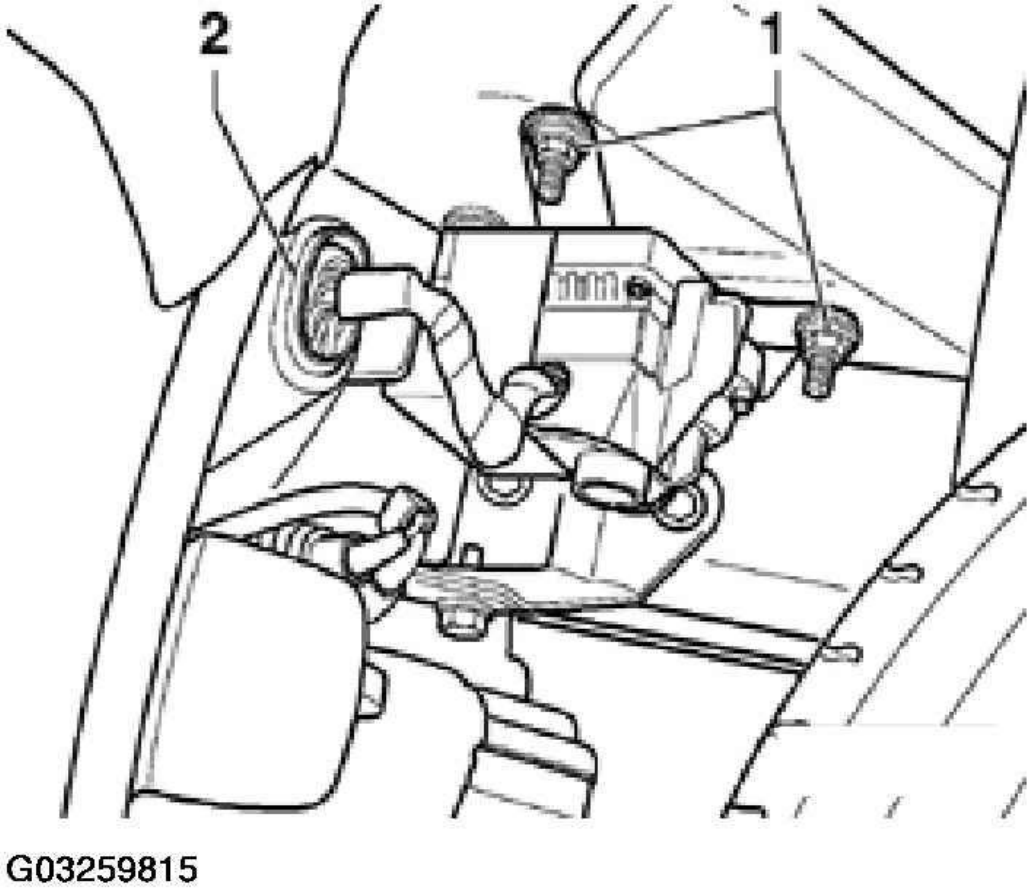

Fig. 50: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove engine cover -arrows-.

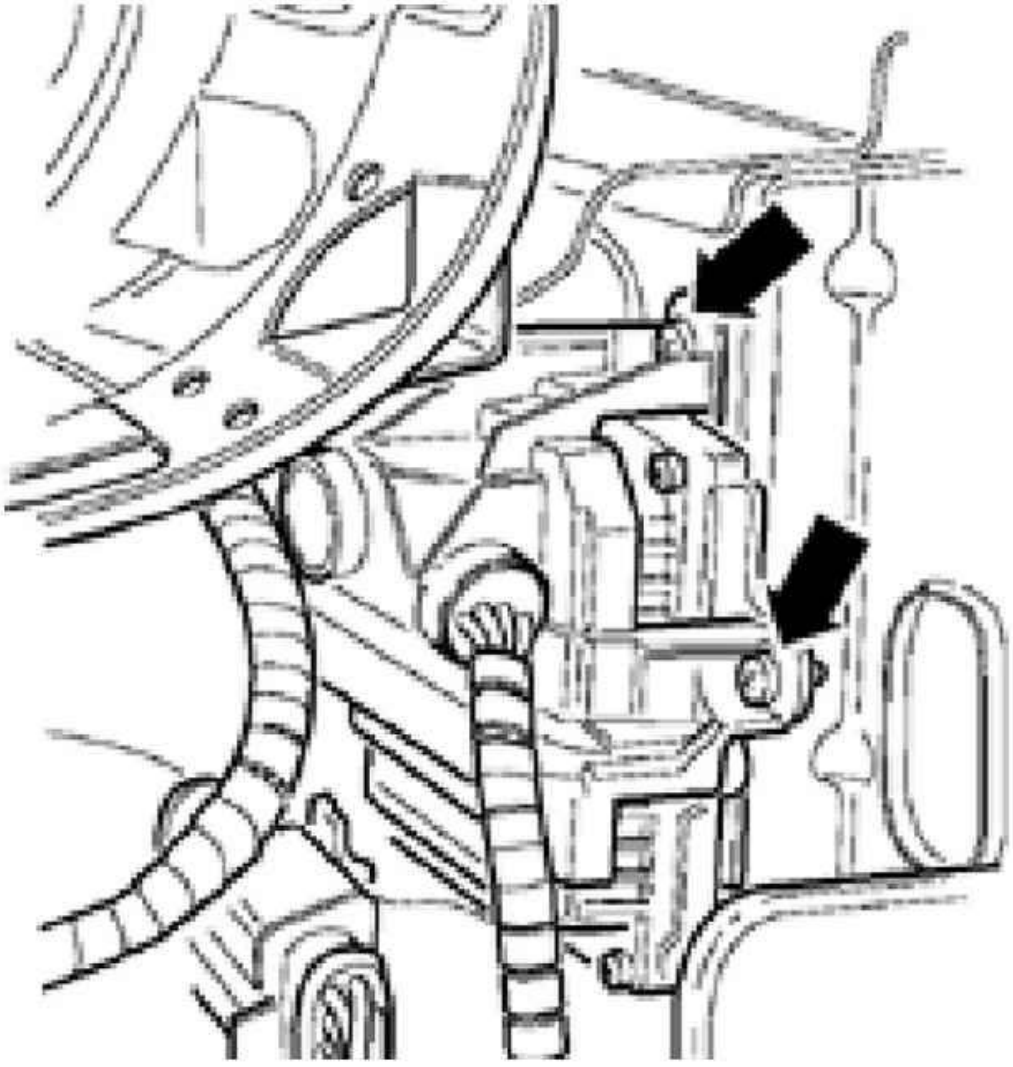

Fig. 51: Removing Engine Cover
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp return hose with hose clamp 3094.

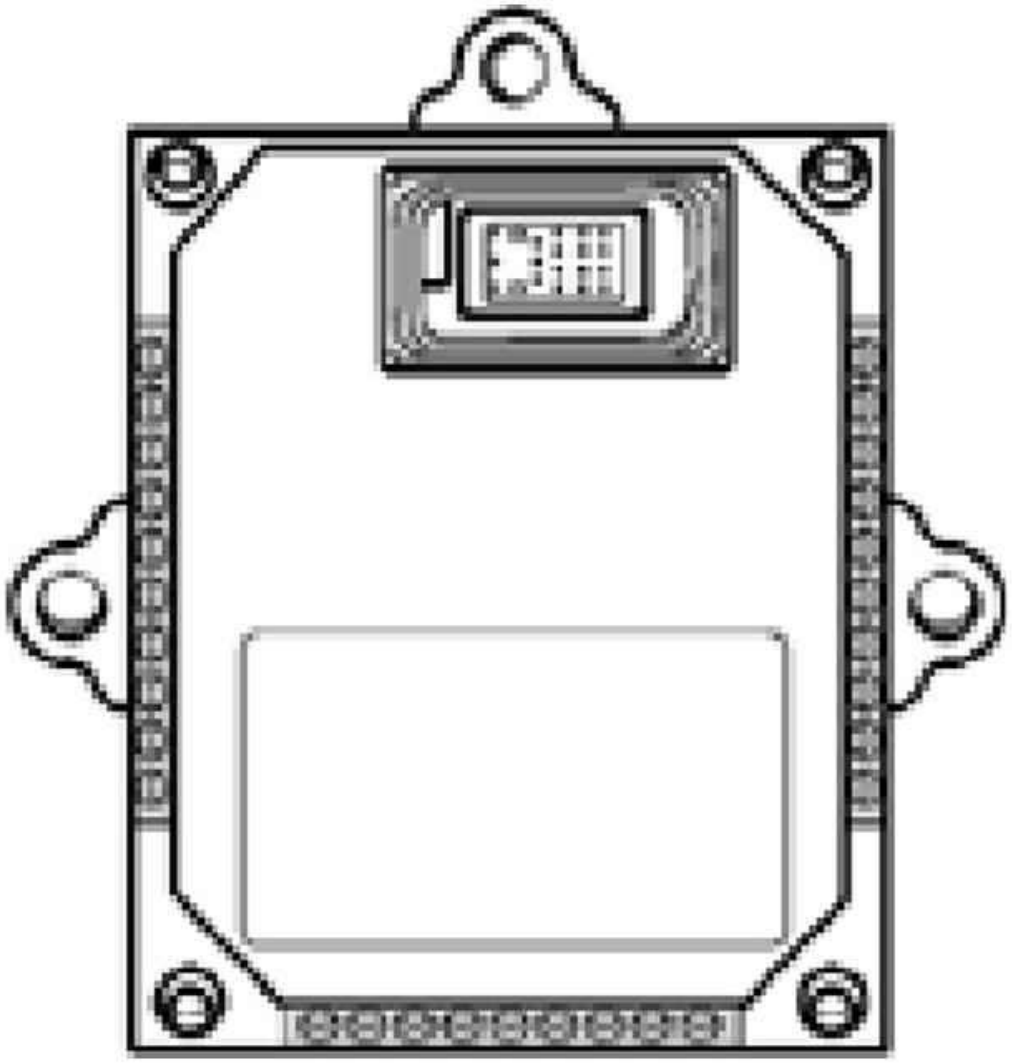

Fig. 52: Clamping Return Hose Clamp With Hose Clamp 3094
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp suction hose with hose clamp 3094.

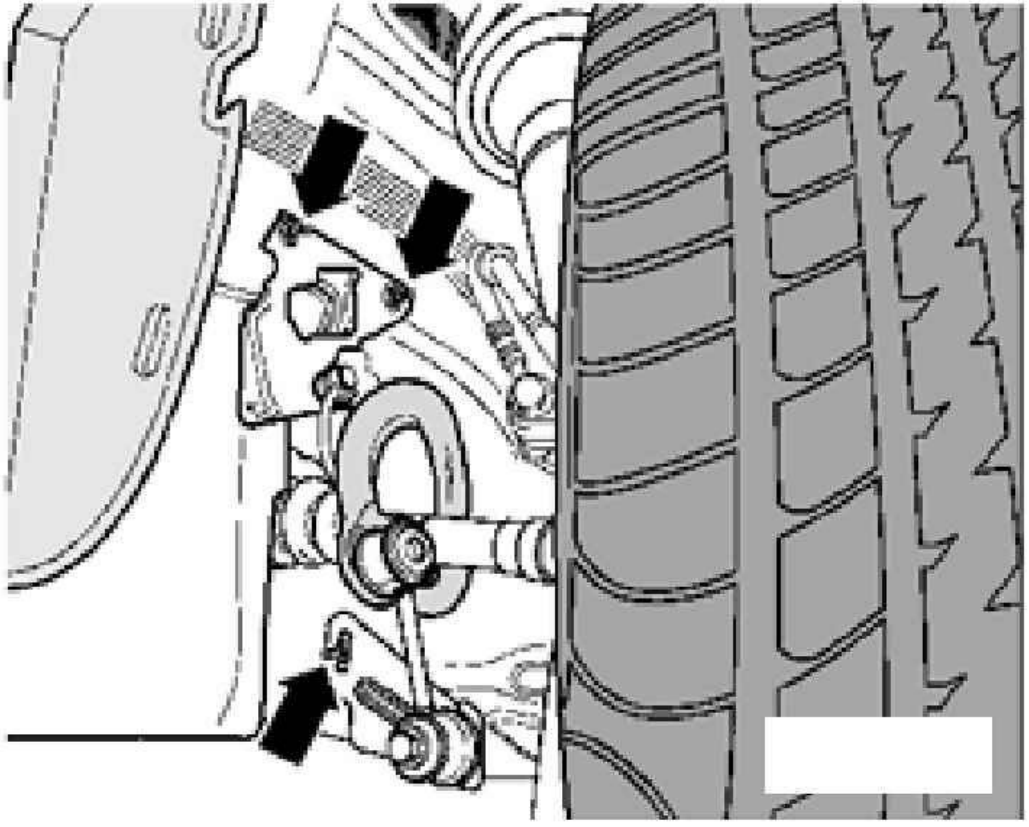

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Fig. 53: Clamping Suction Hose Using Hose Clamp 3094.
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place drip tray underneath.
- Disconnect pump pressure line.

Connecting pressure gauge V.A.G 1402

NOTE: The following list refers to items in Fig. 54 .

1. **V.A.G 1402 Pressure gauge**
2. **V.A.G 1402 Hose from pressure gauge**
3. **V.A.G 1402/6 Hose from adapter set**
4. **V.A.G 1402/1 A Adapter**
5. **Oil seal**

6. **V.A.G 1402/2 Adapter**
7. **Pressure line/hose with Banjo union bolt**
8. **Banjo union bolt**

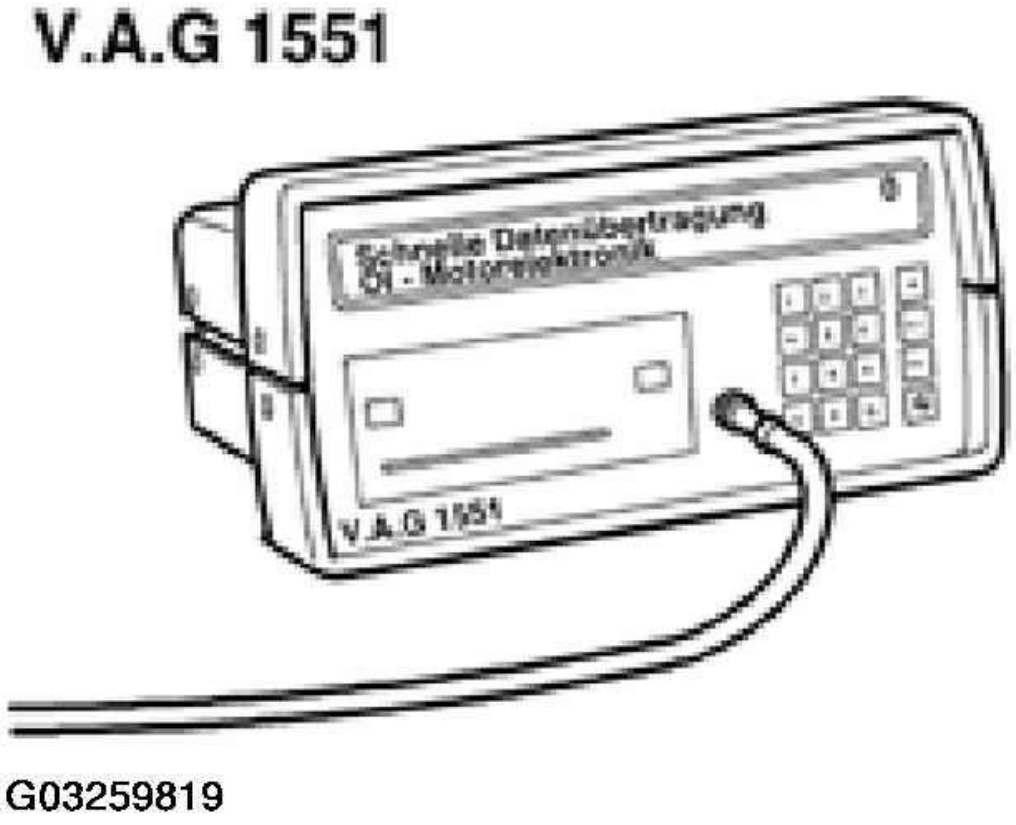

Fig. 54: Connecting Power Steering Pressure Gauge (Vehicles With Power Steering Pump In Upper Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove hose clamp 3094 from suction and return hoses.
- Start engine and if necessary add fluid to reservoir.
- Turn steering wheel approx. 10 times from lock to lock.
- Now check delivery pressure.

Requirements:

- Ribbed belt/ribbed belt tension OK.

- System not leaking.
- Hoses/lines are not kinked or restricted.
    - With engine running at idle speed. Close cut-off valve (not longer than 5 seconds) and read off pressure.

Specifications

Gasoline engines: 85...95 bar (1233 - 1378 psi)

Diesel engines: 96... 105 bar (1392 - 1523 psi)

NOTE:

- **If the reading is higher or lower than specified replace power steering pump:**
- **Removing and installing power steering pump, vehicles with power steering pump in upper section. See POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING .**
- **If reservoir fluid level is low then check steering system for leaks.**
- **For leaks at the pinion first check the lines/line connections for leaks and if necessary tighten and wipe dry.**
- **If the pinion seal or the rack seals in steering gear housing are leaking then replace steering gear.**
- **To check the rack seals loosen the hose clip on the boot and push boot to one side.**

POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING

Special tools and equipment

- 3094 Hose clamps
- V.A.G 1331 Torque wrench
- VAS 5024 Assembly pliers

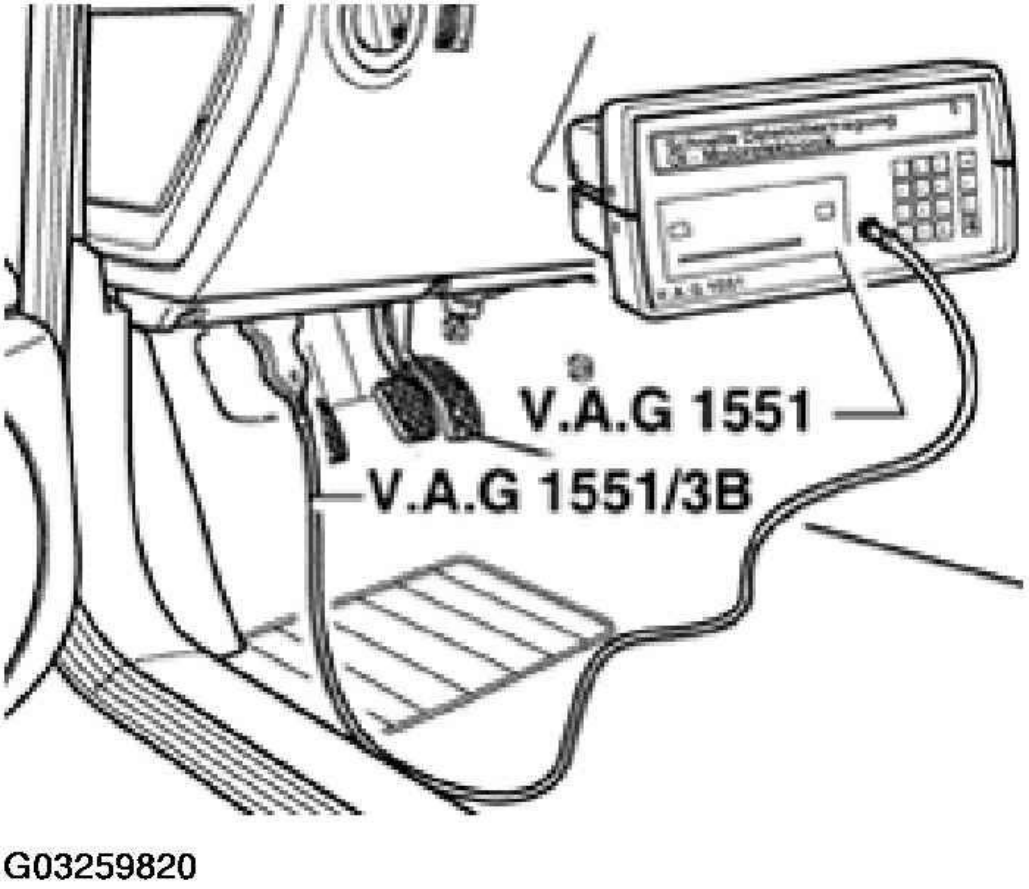

Fig. 55: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The power steering pump is not serviceable. If problems in the pump are suspected, determine the cause with the help of pressure tests, leak test. If malfunctioning, replace complete unit.

NOTE:

- **Pumps supplied as replacement parts are not filled with oil. Therefore it is essential to fill the pump with hydraulic oil Part No. G 002 000 and to rotate it by hand before use. Otherwise the pump may be damaged or noisy during operation.**
- **Part numbers are listed here for reference only. Always check with your parts department for the latest information.**
- **Type of oil hydraulic oil Part No. G 002 000**
- **Oil system capacity: 0.7... 0.9 ltr. (11.8- 15.2 oz.)**

Removing

Vehicles with TDI engine

- Remove noise insulation tray -arrows-.

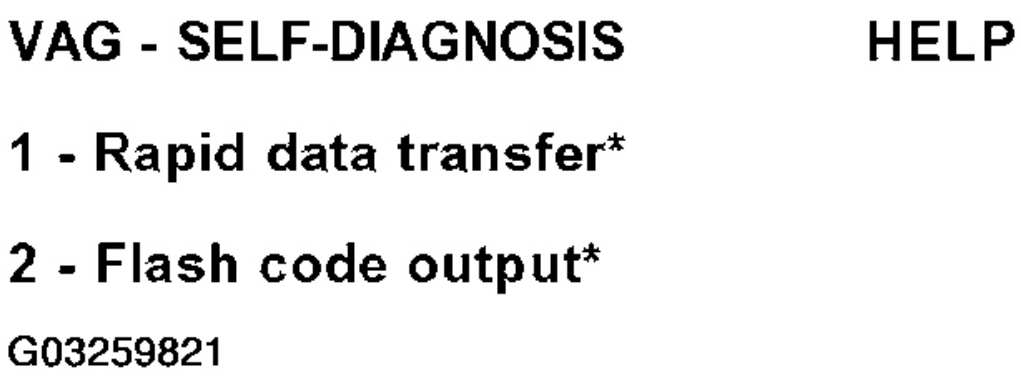

Fig. 56: Removing Noise Insulation Tray (1.9L TDI)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove left noise insulation -arrows-.

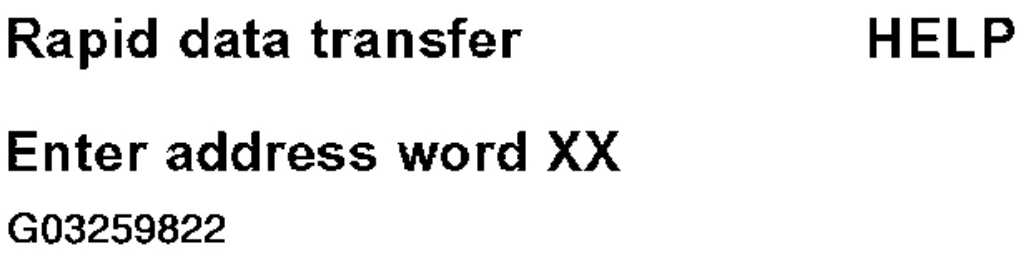

Fig. 57: Removing Left Noise Insulation (1.9L TDI)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with 1.8 ltr. turbo and 2.0 ltr. engines

- Remove center, left and right insulation trays:

See **NOISE INSULATION, ASSEMBLY OVERVIEW** .

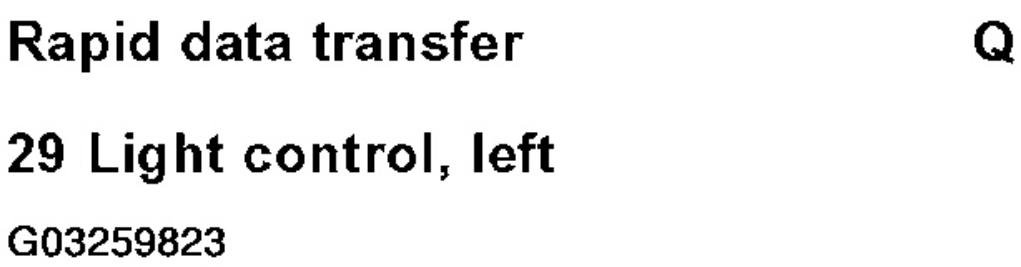

Fig. 58: Removing Center, Left And Right Insulation Trays (1.8L And 2.0L)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Continued for all vehicles

- Remove right noise insulation, if installed.

Vehicles with TDI and 1.8 turbo engines

- Remove intake air duct between charge air cooler and turbocharger.

Continued for all vehicles

- Loosen belt pulley hex socket head bolt.

  Counter-hold using hex. wrench if necessary.

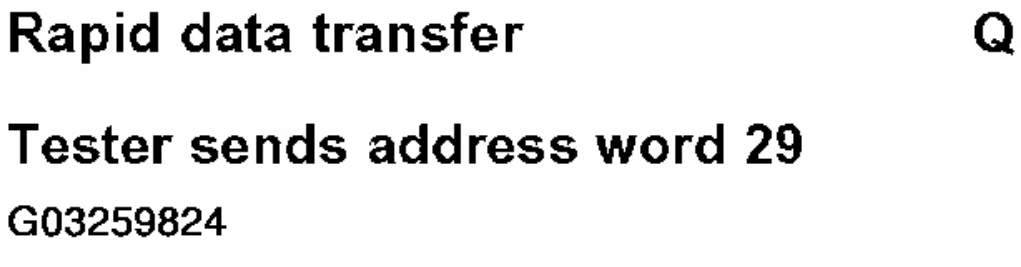

Fig. 59: Removing Belt Pulley Bolt

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Turn tightening device in direction of arrow to relieve tension on ribbed belt.

Fig. 60: Turning Belt Tightening Device In Direction Of Arrow
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Mark direction of travel of ribbed belt with a crayon or marker before removing the ribbed belt. Reinstalling a used belt in the opposite direction could damage the belt.
- Remove ribbed belt.
- Remove belt pulley hex socket head bolt.
- Clamp off suction hose with hose clamps -3094-.
- Open spring-type clip -3- and pull off suction hose.

  Use special tool V.A.S 5024 for this.

- Remove Banjo union bolt -4-.
  - Seal pressure line/hose with a plastic bag or similar.
- Unbolt hex bolts -1- and -2-.

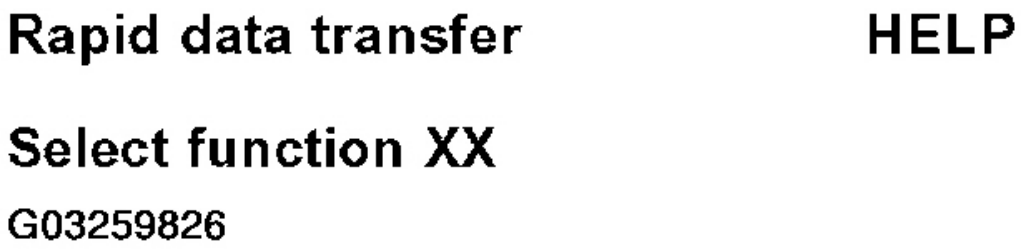

Fig. 61: Power Steering Pump Suction Hose (Vehicles With Power Steering Pump In Lower Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove pump.

Installing

- Fill power steering pump with hydraulic oil.

  Fill pump with oil via suction union.

- Turn hub by hand until oil emits from pressure side.
- Install power steering pump into bracket and tighten bolts to 25 N.m (18.4 ft lb).
- Install suction hose and install spring-type clip.

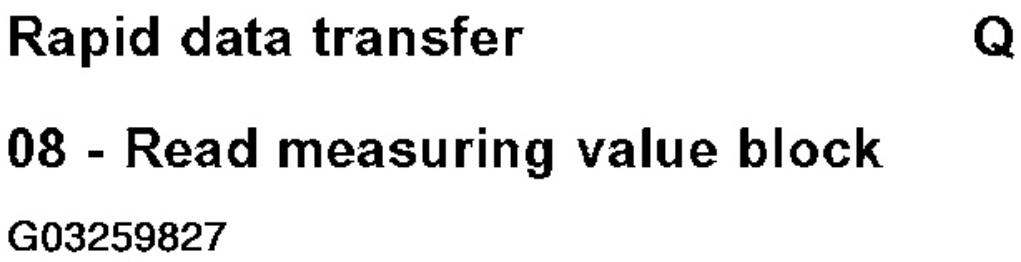

Fig. 62: Installing Suction Hose And Spring-Type Clip (Vehicles With Power Steering Pump In Lower Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The mark -arrow A- must align with casting seam -arrow-

The spring-type clip must close off with mark -arrow B-.

- Install new sealing rings onto banjo union bolt.
- Tighten banjo union bolt to 38 N.m (28 ft lb).

The remainder of the installation is the reverse of removal.

POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING

Special tools and equipment

- 3094 Hose clamps
- V.A.G 1331 Torque wrench
- VAS 5024 Assembly pliers

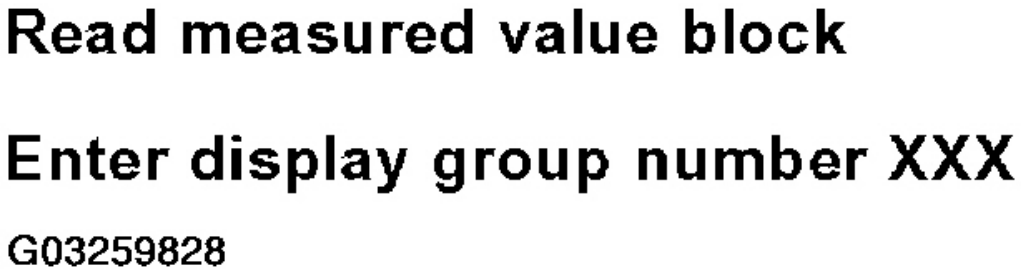

Fig. 63: Identifying Special Tools And Equipment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The power steering pump is not serviceable. If problems in the pump are suspected, determine the cause with the help of pressure tests, leak test. If malfunctioning replace complete unit.

NOTE:

- **Pumps supplied as replacement parts are not filled with oil. Therefore it is essential to fill the pump with hydraulic oil Part No. G 002 000 and to rotate it by hand, otherwise the pump may be damaged or noisy during operation.**
- **Type of oil hydraulic oil Part No. G 002 000**
- **Oil system capacity: 0.7... 0.9 ltr (11.8 - 15.2 oz.).**

- **Part numbers are listed here for reference only. Always check with your parts department for the latest information.**

Removing

For vehicles with TDI engine

- Remove noise insulation tray -arrows-.

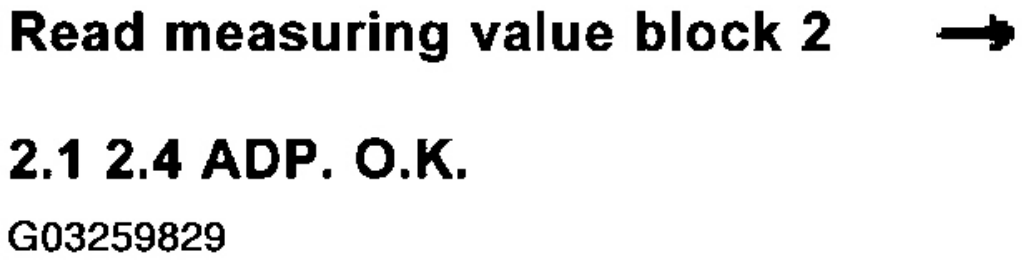

Fig. 64: Removing Noise Insulation Tray (1.9L TDI)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove left-side noise insulation -arrows-.

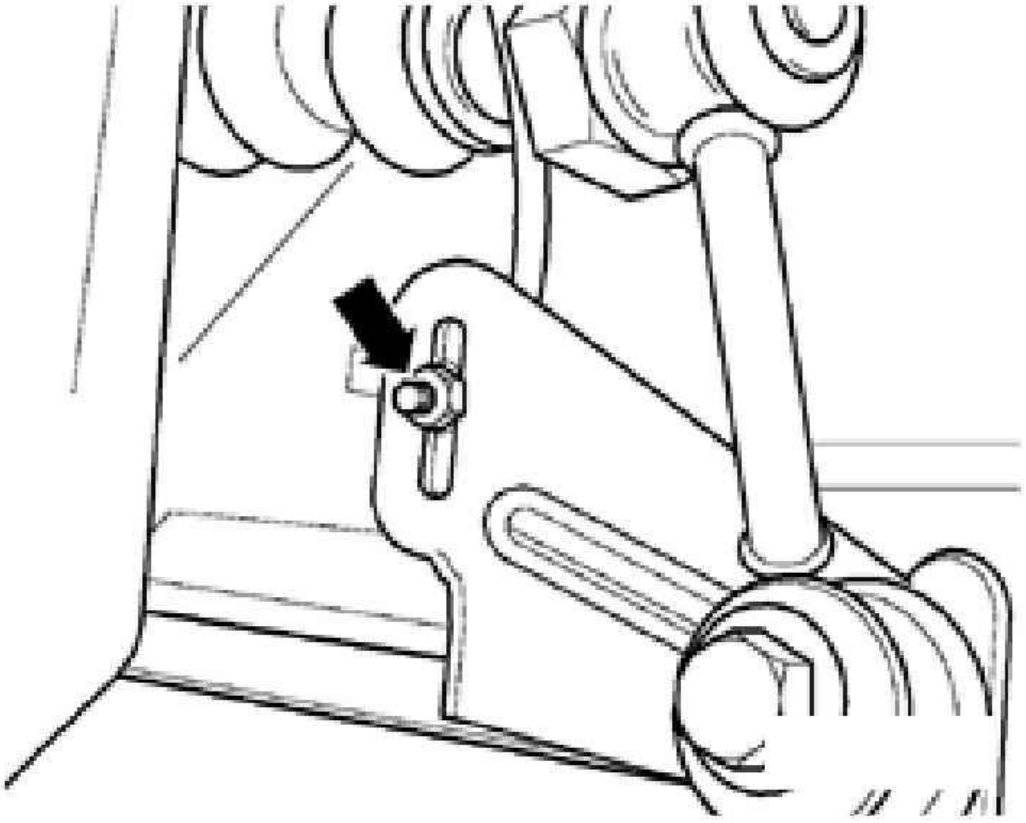

Fig. 65: Removing Left-Side Noise Insulation (1.9L TDI)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with 1.8 ltr. turbo and 2.0 ltr. engines

- Remove center, left and right insulation trays:

  See NOISE INSULATION, ASSEMBLY OVERVIEW .

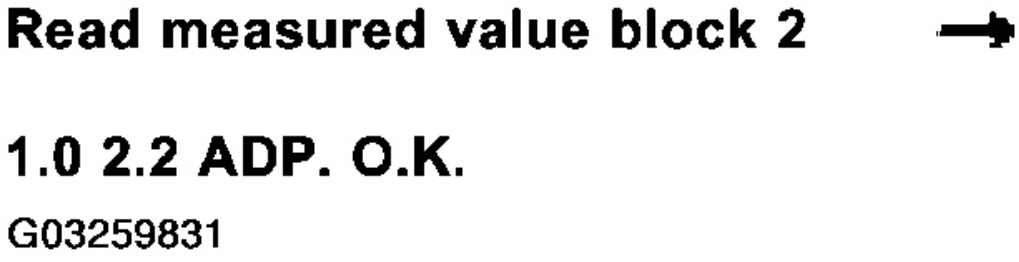

Fig. 66: Removing Center, Left And Right Insulation Trays (1.8L And 2.0L)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Vehicles with TDI and 1.8 ltr. turbo engines

- Remove connecting line between charge air cooler and the turbocharger.

Continued for all vehicles

- Loosen belt pulley hex socket head bolt.

  Counter-hold with a hex wrench if necessary.

Fig. 67: Removing Belt Pulley Bolt
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Turn tightening device in direction of -arrow- to relieve tension on ribbed belt.

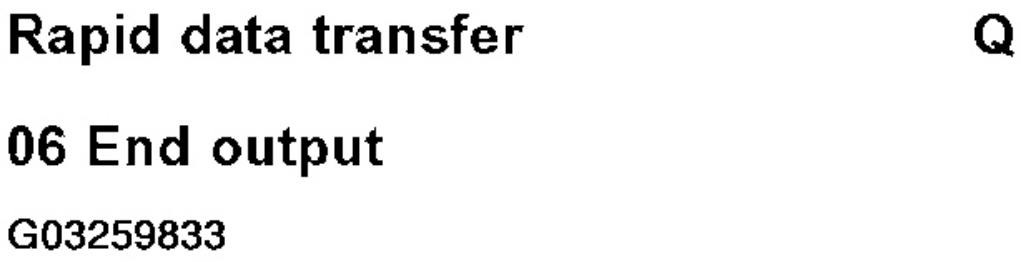

Fig. 68: Turning Belt Tightening Device In Direction Of Arrow (Vehicles With Power Steering Pump In Upper Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Mark direction of travel of ribbed belt with a crayon or marker before removing the ribbed belt. Reinstalling a used belt in the opposite direction could damage the belt.
- Remove ribbed belt.
- Remove belt pulley hex socket head bolt.

Removing suction line and suction hose

- Pull connector off suction line.
- Loosen spring -type clips with special tool VAS 5024.
- Remove suction line and suction hose
- Clamp off return supply hose with hose clamps -3094-.

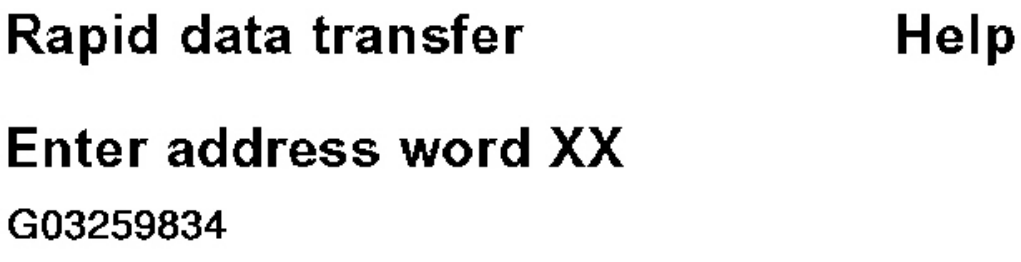

Fig. 69: Clamping Off Return Supply Hose With Hose Clamps -3094-
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp off suction line with hose clamps -3094-.
- Open spring-type clip -1- and disconnect suction line.

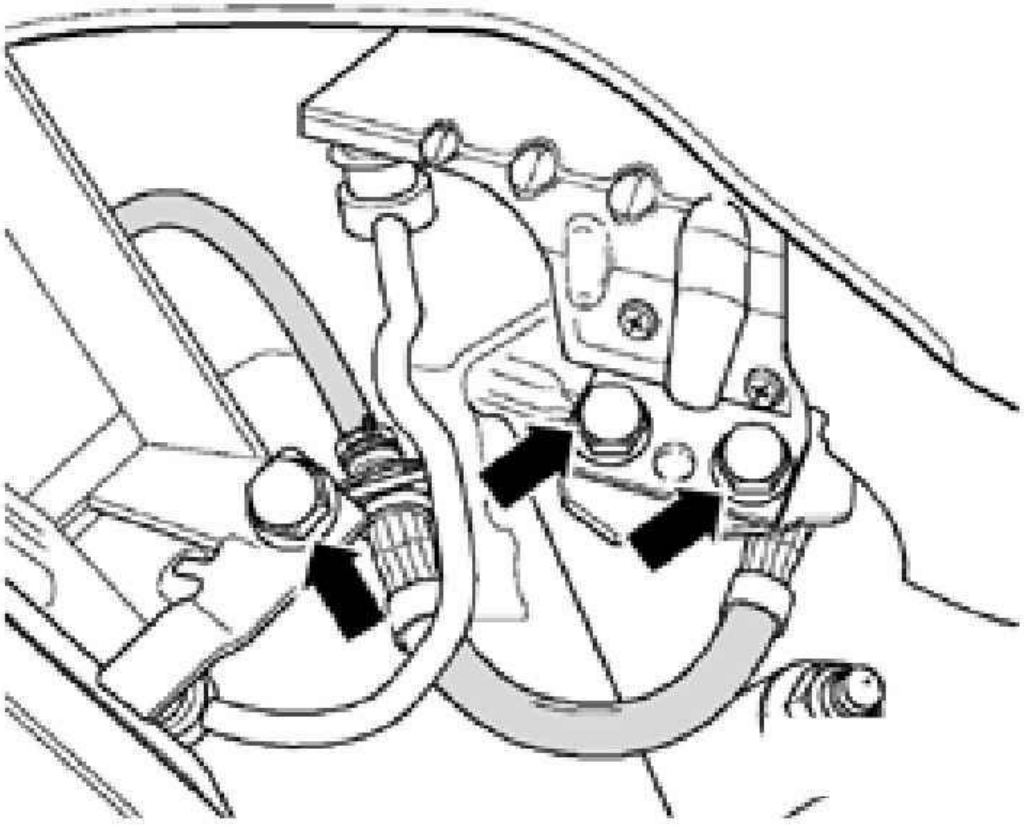

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Fig. 70: Disconnecting Power Steering Pump Suction Line (Vehicles With Power Steering Pump In Upper Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Unscrew banjo union bolt -2-.
  - Seal pressure line/hose with a plastic bag or similar.
- Remove hex bolts -1- and -2-.
- Remove pump.

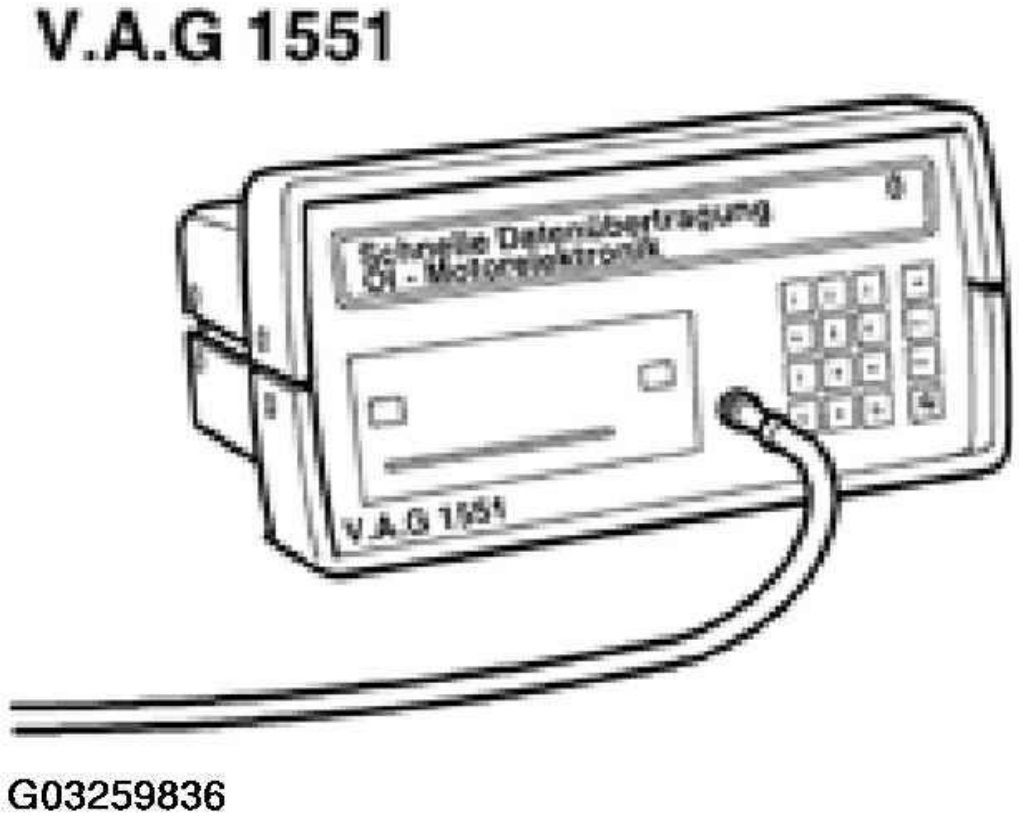

Fig. 71: Removing Power Steering Pump Bolts (Vehicles With Power Steering Pump In Upper Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

- Fill power steering pump with hydraulic oil.

  Fill pump with oil via suction union.

- Turn hub by hand until oil emits from pressure side.
- Install power steering pump into bracket and tighten bolts to 25 N.m (18 ft lb).
- Install suction line and spring-type clip.

  The mark -arrow A- must align with casting seam -arrow-

  The spring-type clip must close off mark -arrow B-.

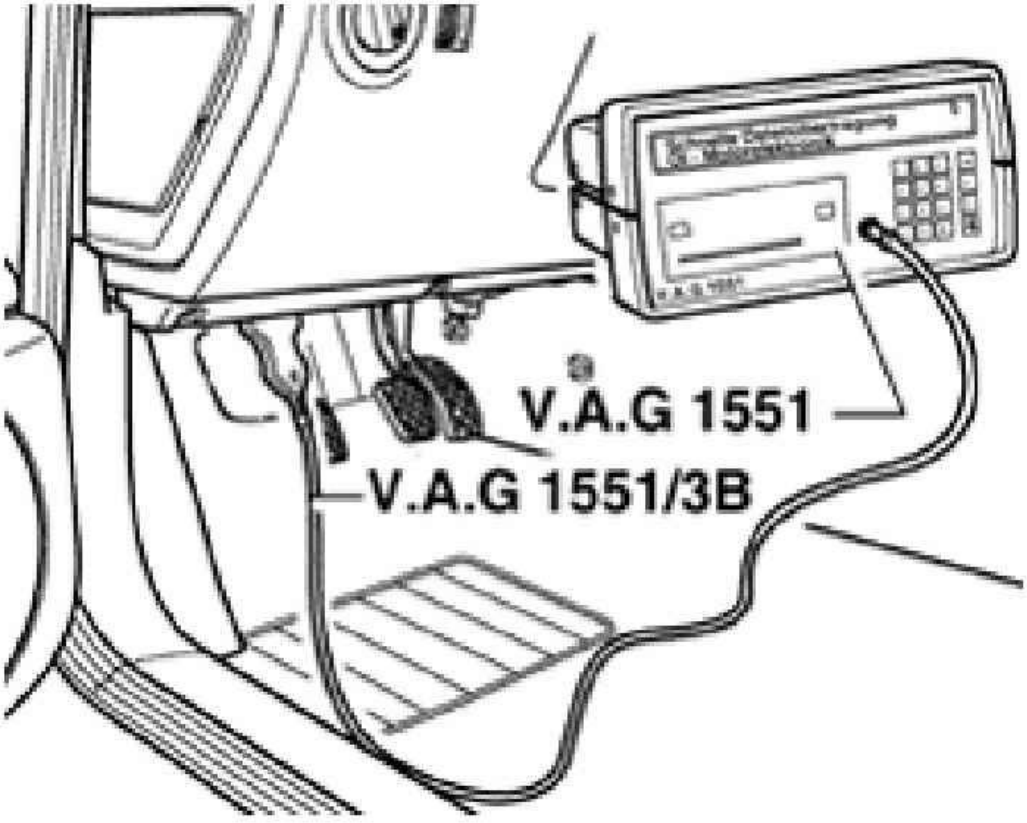

Fig. 72: Installing Suction Line And Spring-Type Clip (Vehicles With Power Steering Pump In Upper Section)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install new sealing rings onto Banjo union bolt.
- Tighten Banjo union bolt to 38 N.m (28 ft lb).

The remainder of the installation is the reverse of removal.

POWER STEERING PUMP WITH HYDRAULIC LINES/HOSES, ASSEMBLY OVERVIEW

I. **Vehicles with power steering pump in upper section**
II. **Vehicles with power steering pump in lower section**

NOTE: The following list refers to items in Fig. 73 .

1. **Reservoir**

   Disassembling and assembling instructions. See **DISASSEMBLING AND ASSEMBLING RESERVOIR**

2. **Securing pressure hose/line**

   Vehicles with TDI engine and A/C

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE AND SUCTION HOSE ON VEHICLES WITH TDI ENGINE AND A/C**

3. **Pressure hose/line mounting**

   Vehicles with 2.0 ltr. and TDI engine without A/C

   Vehicles with 1.8 ltr. turbo engine with A/C

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE AND SUCTION HOSE ON VEHICLES WITH 2.0 LTR., & TDI ENGINE WITHOUT A/C AND VEHICLES WITH 1.8 LTR. TURBO ENGINE AND A/C**

   Vehicles with 2.0 ltr. engine with A/C

   Vehicles with 1.8 ltr. turbo engine without A/C

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE AND SUCTION HOSE ON VEHICLES WITH 2.0 LTR. ENGINE AND A/C** .

4. **Securing suction hose**
5. **Pressure hose/line mounting**

   On 5-speed manual - transmission 02J

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE ON 5-SPEED MANUAL TRANSMISSION 02J** .

   On 6-speed manual transmission 02M

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE ON 6-SPEED MANUAL TRANSMISSION 02M** .

6. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES** .

- Before installing fill with oil Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES** .

7. **Pressure hose/line mounting**

   On automatic transmission 01M

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE ON AUTOMATIC TRANSMISSION 01M** .

Fig. 73: Identifying Power Steering Pump With Hydraulic Lines/Hoses
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Disassembling and assembling reservoir

NOTE: The following list refers to items in Fig. 74 .

1. **Cap with dip stick**
   - Oil level: between MIN. and MAX marks; Engine temperature approx. 50° C
   - Check oil level with cap bolt on
   - With engine cold, oil level must not rise above MIN. marking
   - Open cap with e.g. a bar
   - Arrow A: oil level with engine cold
2. **Spring-type clip**
3. **Return hose**
4. **Suction hose**
5. **Bolt/screw** ,
   - 10 N.m (7.4 ft lb)
6. **Reservoir**
7. **Battery console**

Rapid data transfer HELP

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Fig. 74: Disassembling And Assembling Power Steering Pump Reservoir
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on vehicles with TDI engine and A/C

NOTE: The following list refers to items in Fig. 75 .

1. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES** .
   - Before installing fill with oil. See Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES** .
2. **Suction hose**
3. **Spring-type clip**
4. **Pressure line**
5. **Banjo union bolt**
   - 38 N.m (28 ft lb)
6. **Sealing rings**
   - Always replace
7. **Hex socket head bolt**
   - 40 N.m (30 ft lb)
8. **Hex nut**
   - 22 N.m (16 ft lb)
9. **Mounting bracket**
10. **Cylinder block**

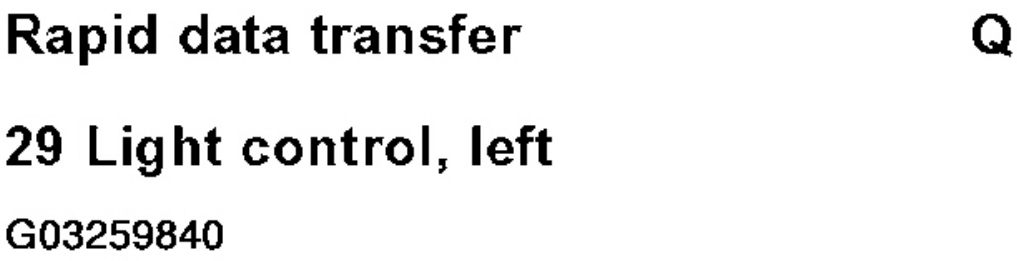

Fig. 75: Identifying Pressure Line And Suction Hose (Vehicles With 1.9L TDI Engine And A/C)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on vehicles with 2.0 ltr. & TDI engine without A/C and vehicles with 1.8 ltr. turbo engine and A/C

NOTE: The following list refers to items in Fig. 76 .

1. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
   - Before installing fill with oil, see Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
2. **Suction hose**
3. **Spring-type clip**
4. **Pressure line**
5. **Banjo union bolt**
   - 38 N.m (28 ft lb)
6. **Sealing rings**
   - Always replace
7. **Mounting bracket**
8. **Hex bolt**
   - 22 N.m (16 ft lb)
9. **Hex bolt**
   - 40 N.m (30 ft lb)
10. **Clamp**
11. **Mounting bracket**
12. **Cylinder block**

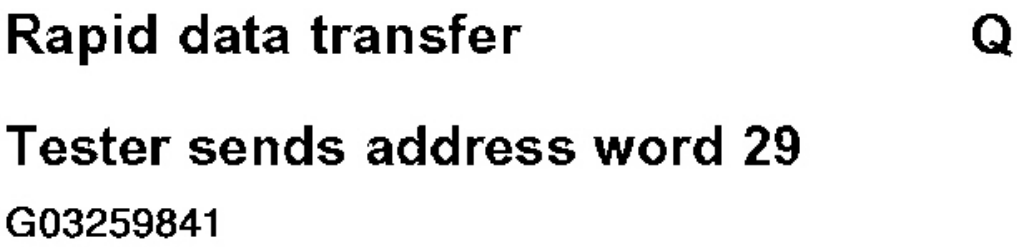

Fig. 76: Identifying Pressure Line And Suction Hose (vehicles With 2.0 ltr. & 1.9L TDI Engine Without A/C And Vehicles With 1.8 ltr. Turbo Engine And A/C)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on vehicles with 2.0 ltr. engine and A/C

NOTE: The following list refers to items in Fig. 77 .

1. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
   - Before installing fill with oil. See Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
2. **Suction hose**
3. **Spring-type clip**
4. **Pressure line**
5. **Banjo union bolt**
   - 38 N.m (28 ft lb)
6. **Sealing rings**
   - Always replace
7. **Lock nut**
8. **Mounting bracket**
9. **Hex bolt**
   - 22 N.m (16 ft lb)
10. **Hex bolt**
    - 40 N.m (30 ft lb)
11. **Mounting bracket**
12. **Cylinder block**

Fig. 77: Identifying Pressure Line And Suction Hose (2.0 ltr. Engine And A/C)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on vehicles with unit injector TDI engine

NOTE: The following list refers to items in Fig. 78 .

1. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
   - Before installing fill with oil Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
2. **Banjo union bolt**
   - 38 N.m (28 ft lb)
3. **Sealing rings**
   - Always replace
4. **Pressure line**
5. **Spring-type clip**
6. **Sleeve**
   - For power steering pumps from the company Kayaba only
7. **Hex bolt**
   - 22 N.m (16.2 ft lb)
8. **Clamp**
9. **Suction hose**
10. **Cylinder block**
11. **Mounting bracket**
12. **Hex bolt**
    - 40 N.m (30 ft lb)

- M10x25

13. **Hex bolt**
    - 40 N.m (30 ft lb)
    - M8x28
14. **Oil filter**
15. **Transmission**
16. **Hex bolt**
    - 38 N.m (28 ft lb)

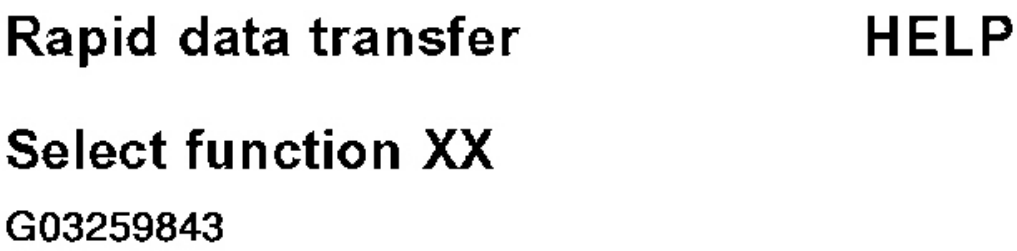

Fig. 78: Identifying Pressure Line And Suction Hose (Vehicles With Unit Injector 1.9L TDI Engine)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line on 5-speed manual transmission 02J

NOTE: The following list refers to items in Fig. 79 .

1. **Pressure line**
2. **Speed nut**
3. **Mounting bracket**
4. **Hex bolt**
    - 22 N.m (16 ft lb)
5. **Mounting bracket**
6. **Pressure hose**

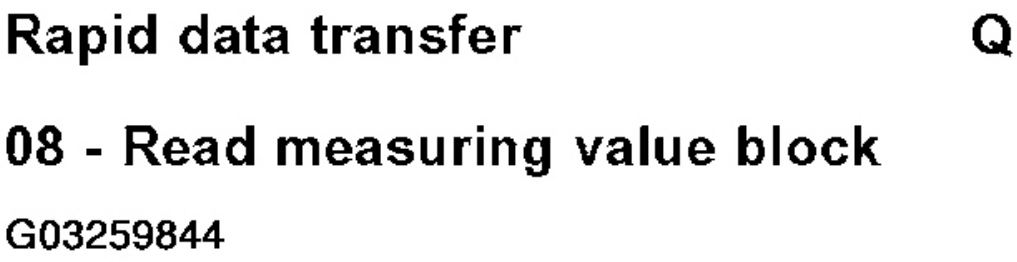

Fig. 79: Identifying Securing Pressure Line On 5-Speed Manual Transmission 02J
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line on 6-speed manual transmission 02M

NOTE: The following list refers to items in Fig. 80 .

1. **Pressure line**
2. **Hex nut**
   - 22 N.m (16 ft lb)
3. **Mounting bracket**
4. **Securing bolt on starter**
5. **Hex bolt**
   - 22 N.m (16 ft lb)
6. **Mounting bracket**
7. **Hex nut**
   - 22 N.m (16 ft lb)
8. **Mounting bracket**

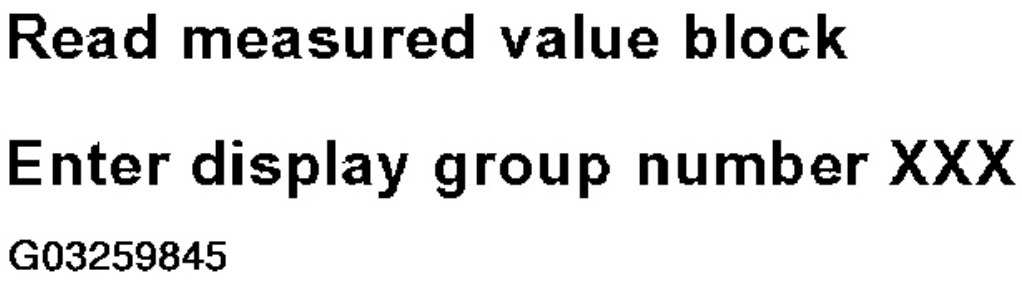

Fig. 80: Identifying Securing Pressure Line On 6-Speed Manual Transmission 02M
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line on automatic transmission 01M

NOTE: The following list refers to items in Fig. 81 .

1. **Securing bolt on starter**
2. **Hex nut**
   - 22 N.m (16 ft lb)
3. **Mounting bracket**
4. **Hex bolt**
   - 22 N.m (16 ft lb)
5. **Mounting bracket**
6. **Pressure line**

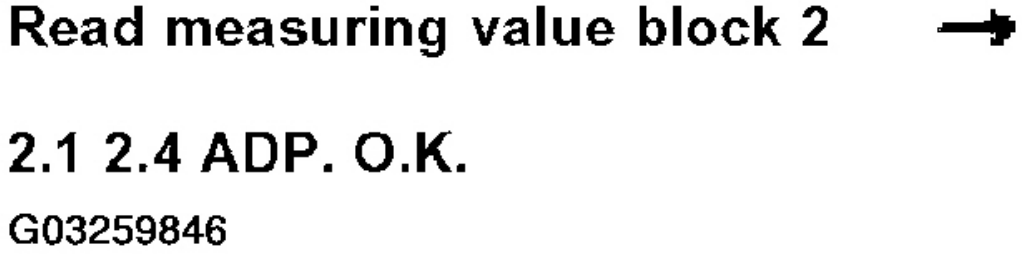

Fig. 81: Identifying Securing Pressure Line On Automatic Transmission 01M

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Disassembling and assembling reservoir

NOTE: The following list refers to items in Fig. 82 .

1. **Cap with dip stick**
   - Oil level: between MIN. and MAX marks; Engine temperature approx. 50°C
   - Arrow A: oil level with engine cold
   - With engine cold, oil level must not rise above MIN. marking
   - Check oil level with cap bolt on
   - Open cap with e.g. a bar
2. **Spring-type clip**
3. **Return hose**
4. **Longitudinal member right side**
5. **Nut**
   - 10 N.m (7.4 ft lb)
6. **Mounting bracket**
7. **Suction hose**
8. **Engine mounting**
9. **Reservoir**
10. **10-Hex bolt**
    - 10 N.m (7.4 ft lb)

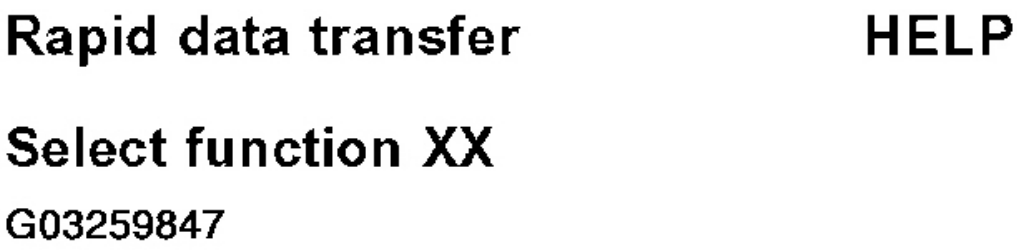

Fig. 82: Disassembling And Assembling Reservoir
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose

NOTE: The following list refers to items in Fig. 83 .

1. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
   - Before installing fill with oil. See Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
2. **Spring-type clip**
3. **Suction hose**
4. **Hex socket head bolt**
   - 10 N.m (7.4 ft lb)
5. **Nut**
   - 10 N.m (7.4 ft lb)
6. **Hex socket head bolt**
   - 10 N.m (7.4 ft lb)
7. **Mounting bracket**
8. **Banjo union bolt**
   - 38 N.m (28 ft lb)
9. **Pressure line**
10. **Sealing rings**
    - Always replace
11. **Bumper carrier**
12. **Rip tube radiator**
13. **Radiator**
14. **Longitudinal member**
15. **Return hose**
16. **Spring-type clip**
17. **Hex bolt**
    - 9 N.m (80 in lb)
    - New Beetle Sedan: M6x25
    - New Beetle Convertible: M8x25

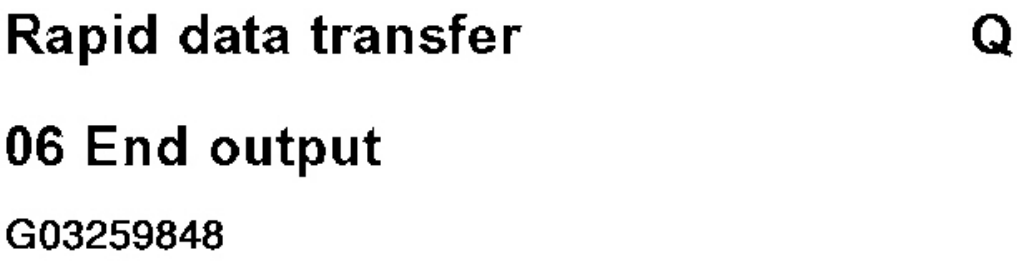

Fig. 83: Identifying Securing Pressure Line And Suction Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

POWER STEERING PUMP WITH HYDRAULIC LINES, VEHICLES WITH AUTOMATIC TRANSMISSION 09G, ASSEMBLY OVERVIEW

Disassembling and assembling instructions to secure pressure line and suction hose on the power steering pump. See **SECURING PRESSURE LINE AND SUCTION HOSE ON THE POWER STEERING PUMP**

Disassembling and assembling instructions to secure pressure line and suction hose on automatic transmission. See **SECURING PRESSURE LINE AND SUCTION HOSE ON THE AUTOMATIC TRANSMISSION 09G**

NOTE: The following list refers to items in Fig. 84 .

1. **Reservoir**

   Disassembling and assembling instructions. See **DISASSEMBLING AND ASSEMBLING RESERVOIR**

2. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
   - Before installing fill with oil Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
3. **Pressure hose/line mounting**
   - On the power steering pump
4. **Securing suction hose**
   - On the power steering pump
5. **Suction hose**
6. **Securing suction hose**

- On cylinder block

7. **Pressure line**
8. **Pressure hose/line mounting**

   On automatic transmission 09G

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE AND SUCTION HOSE ON THE POWER STEERING PUMP**

9. **Securing return hose**

   On automatic transmission 09G

   Disassembling and assembling instructions. See **SECURING PRESSURE LINE AND SUCTION HOSE ON THE POWER STEERING PUMP**

10. **Return hose**

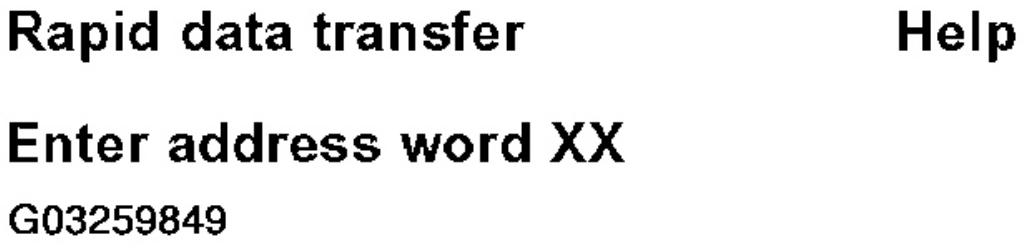

Fig. 84: Identifying Power Steering Pump With Hydraulic Lines (Vehicles With Automatic Transmission 09G)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on the power steering pump

NOTE: The following list refers to items in Fig. 85 .

1. **Banjo union bolt**
   - 38 N.m (28 ft lb)
2. **Sealing rings**
   - Always replace
3. **Pressure line**

4. **Power steering pump**
    - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
    - Before installing fill with oil Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
5. **Sleeve**
    - Power steering pumps for the company Kayaba only
6. **Clamp**
7. **Hexagon bolt**
    - 22 N.m (16 ft lb)
8. **Spring-type clip**
9. **Suction hose**
10. **Mounting bracket**
    - On the cylinder block
11. **Mounting bracket**
12. **Hex bolt**
    - 40 N.m (30 ft lb)

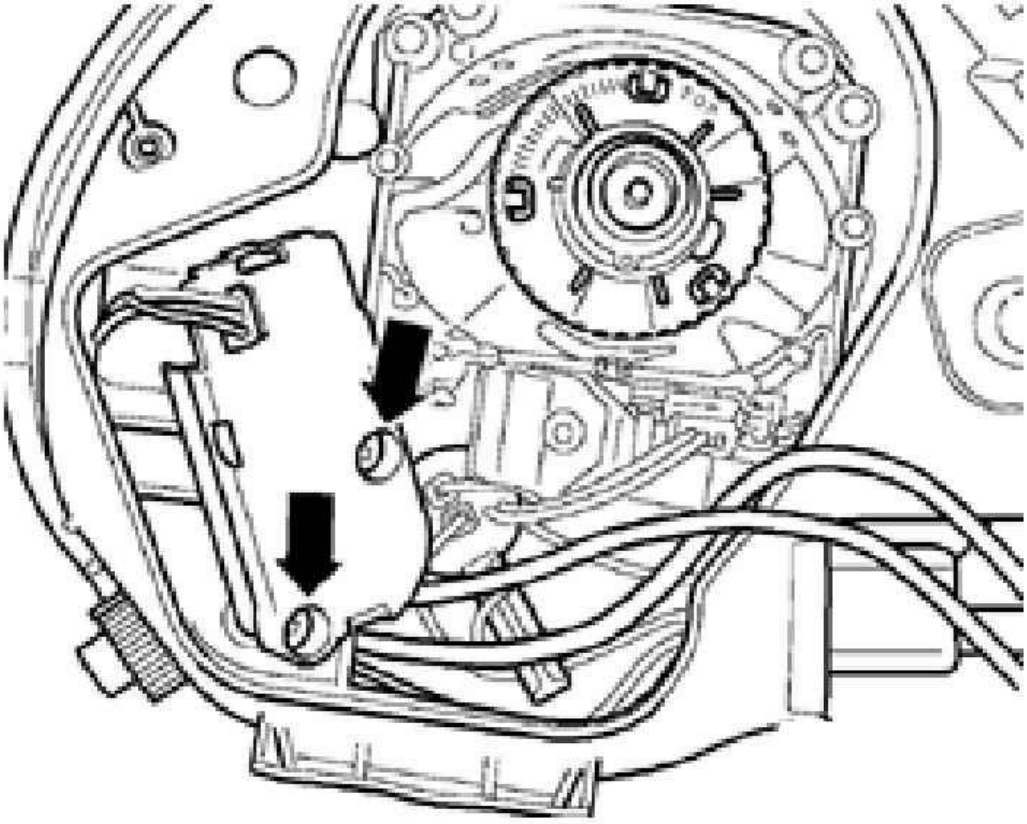

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Fig. 85: Identifying Pressure Line And Suction Hose
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing pressure line and suction hose on the automatic transmission 09G

NOTE: The following list refers to items in Fig. 86 .

1. **Automatic transmission**
2. **Twin bolt**
   - 40 N.m (30 ft lb)
3. **To reservoir**
4. **Hex nut**
   - 22 N.m (16 ft lb)
5. **Return hose**

6. **From the steering gear**
7. **From the power steering pump**
8. **Pressure line**
9. **Hex bolt**
    - 22 N.m (16 ft lb)
10. **To steering gear**

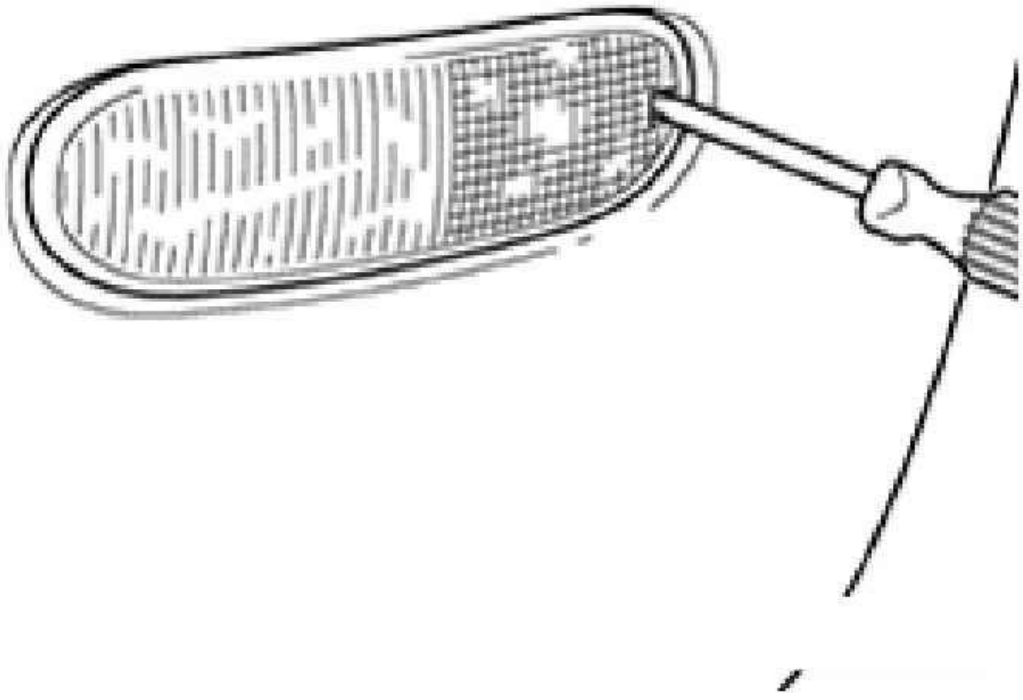

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Fig. 86: Identifying Pressure Line And Suction Hose On Automatic Transmission 09G
Courtesy of VOLKSWAGEN OF AMERICA, INC.

POWER STEERING PUMP IN LOWER SECTION, ASSEMBLY OVERVIEW

Vehicles with power steering pump in lower section

NOTE: The following list refers to items in Fig. 87 .

1. **Mounting bracket**

2. **Hex bolt**
    - 25 N.m (18 ft lb)
3. **Banjo union bolt**
    - 38 N.m (28 ft lb)
4. **Pressure line**
5. **Sealing rings**
    - Always replace
6. **Suction hose**
7. **Spring-type clip**
8. **Power steering pump**
    - Checking delivery pressure. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
    - Before installing fill with oil Note **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
9. **Belt pulley**
10. **Hexsocket head bolt**
    - 25 N.m (18 ft lb)
11. **Ribbed belt**
    - Mark the direction of travel with a crayon or marker before removing. Reinstalling a used belt in the opposite direction could damage the belt.
    - When installing the belt, make sure that it is correctly seated in the pulleys.
    - Application. See Parts catalog
    - Removing and belt routing

      See RIBBED BELT, REMOVING AND INSTALLING in appropriate ENGINE MECHANICAL article

    - Checking condition

      See CHECKING CONDITION in **RIBBED V-BELT, CHECKING CONDITION** article

12. **Tensioner for ribbed belt**

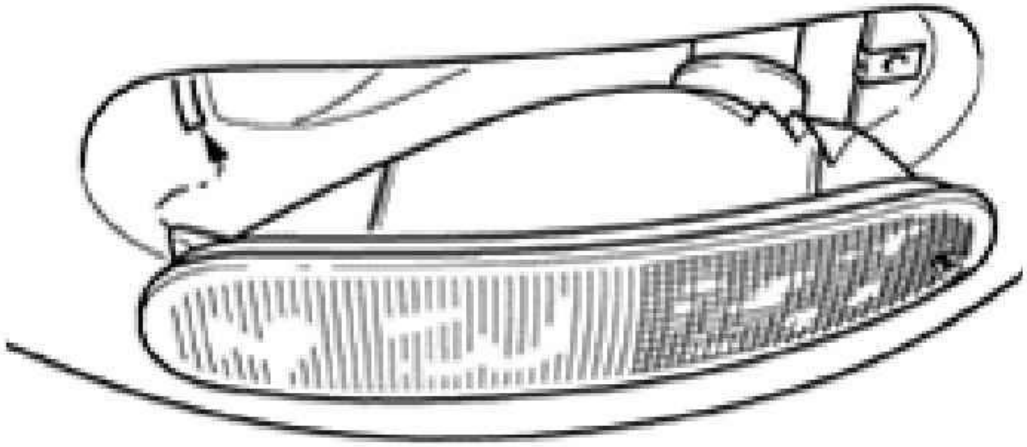

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Fig. 87: Identifying Power Steering Pump In Lower Section
Courtesy of VOLKSWAGEN OF AMERICA, INC.

POWER STEERING PUMP IN UPPER SECTION, ASSEMBLY OVERVIEW

Vehicles with power steering pump in upper section

NOTE: The following list refers to items in Fig. 88 .

1. **Mounting bracket**
2. **Hex bolt**
   - 25 N.m (18 ft lb)
3. **Power steering pump**
   - Checking delivery pressure. See **POWER STEERING PUMP DELIVERY PRESSURE, VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, CHECKING**
   - Before installing fill with oil. See Note. See **POWER STEERING PUMP, RESERVOIR, HYDRAULIC LINES**
4. **Sealing rings**
   - Always replace
5. **Pressure line**
6. **Banjo union bolt**
   - 38 N.m (28 ft lb)
7. **Suction hose**

8. **Belt pulley**
9. **Hex socket head bolt**
    - 25 N.m (18 ft lb)
10. **Ribbed belt**
    - Mark the direction of travel with a crayon or marker before removing. Reinstalling a used belt in the opposite direction could damage the belt.
    - When installing the belt, make sure that it is correctly seated in the pulleys.
    - Application see Parts catalog
    - Removing and belt routing

      See RIBBED BELT, REMOVING AND INSTALLING in appropriate ENGINE MECHANICAL article

    - Checking condition

      See CHECKING CONDITION in **RIBBED V-BELT, CHECKING CONDITION** article

11. **Tensioner for ribbed belt**

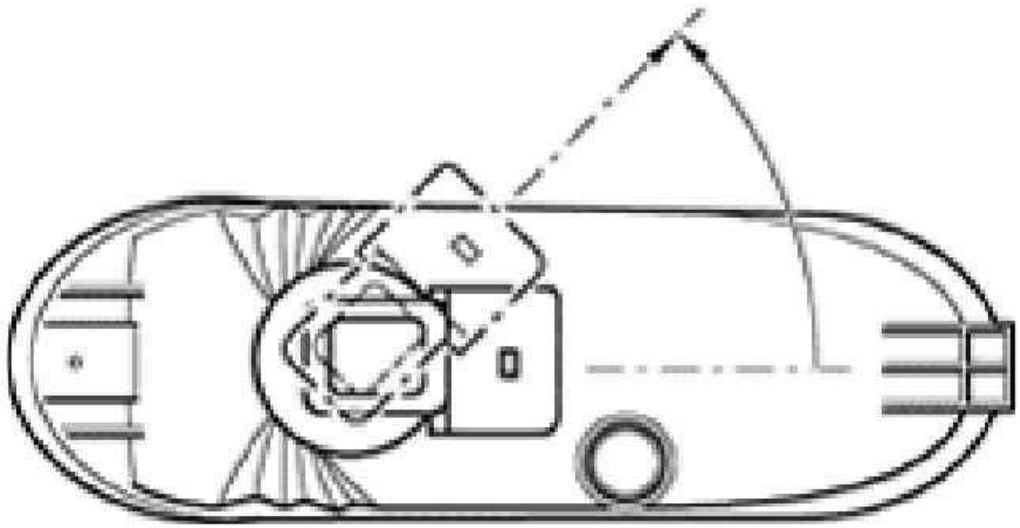

Fig. 88: Identifying Power Steering Pump In Upper Section
Courtesy of VOLKSWAGEN OF AMERICA, INC.

DEFINITIONS

These explanations are only relevant for this assembly group: Suspension, Wheels, Steering. They are not necessarily relevant generally.

PART NO.

Abbreviation for Part No.

STEERING ANGLE SENSOR

The steering angle sensor registers the angle that equates to the angle (lock) of the wheels and therefore the direction selected by the driver.

HELI-COIL

A coil of spring steel which is screwed into a threaded hole and is used as the inner thread to secure a bolt/screw.

HYTREL (POLYELASTOMER)

Substance which remains elastic especially at room temperature right up to break-up temperature.

PR. NO.

Abbreviation for Production Control Number and is used to identify optional equipment, country specific deviations and suspension details, and other informations.

REP.-GR.

Abbreviation for repair group

SETTLING PROCESS

Plastic (non-reversible) distortion of the vehicle springs caused by the weight of the vehicle.

TOE

Offset adjustment of wheel plane to direction of travel.

TURN DIFFERENCE ANGLE

Difference between the turning lock angle of the curve inner wheel and the turning lock angle of the curve outer wheel.

CAMBER

Angle between wheel plane and a vertical to plane of road surface. It is positive when the top of the wheel leans outward and negative when it leans inward.

AF

Abbreviation for across flats of wrench.

TRIPLE ROLLER JOINT

Widely used version of constant velocity joint with three rollers in the form of a star.